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ABSTRACT

This collection of conference papers and abstracts includes: "Integrating Two Languages, Theories of Minds, and Executive Functions" (Agnes Melinda Kovacs and Erno Teglas); "Unconventional Thinking for Speaking: The Blends of George W. Bush" (Alan Cienki); "Blends of Alternations in the Grammar of Brazilian Vernacular Portuguese" (Alice Lana); "Blending as a Resource for the Study of Conversations in Complex Settings" (Annalisa Sannino); "Blending and Perspective: Jonathan Raban's Travels through Mental Spaces" (Barbara Dancygier); "How Do We Interpret Proverbs? A Conceptual Blending Approach" (Christine Michaux); "Conceptual Integration Networks and Philosophical Theories of Meaning: An Exploratory Discussion" (Cynthia M. Grund); "The Way Logicians Think?" (Erling Wande); "Conceptual Blending and Viewpoint" (Eve Sweetser); "Piercing Dolls and Burning Hair: Conceptual Blending in Magical Rituals" (Jesper Sorensen); "Generalized Conceptual Spaces, their Morphisms, and their Blends, With Applications to User Interface Design" (Joseph Goguen); "Metaphors as Inputs to Conceptual Integration" (Joseph Grady); "The Acquisition of the Ditransitive Construction" (Kai Kiekhoefer); "Conceptual Blending and Music" (Lawrence Zbikowski); "The Way We Begin to Think: Generation of Abstract Concepts in Chinese Characters" (Masako K. Hiraga); "Outline of a Typology of Compound Noun Blendings" (Peer Bundgaard, Frederik Stjernfelt, and Svend Oestergaard); "The Role of Schemata in Compound Noun Blending" (Peer Bundgaard, Frederik Stjernfelt, and Svend Oestergaard); "Creating Mathematical Infinities: The Beauty of Transfinite Cardinals" (Rafael Nunez); "On the Construction of the Concept 'Language': Entrenched Conceptual Integration Networks Encountered in Evolutionary Biology and Language Evolution" (Roslyn M. Frank); "Blending of a Single

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Event: Integration of Viewpoints" (Soichi Kozai); "Can Conceptual Integration Explain Why a Road Can Creep, Go, or Race" (Teenie Matlock); "It's Not Just the Way We Think! Mimesis, Artistic Inspiration and the Blends We Live By" (Tom Rohrer); "Why Does Time Flow and Where Does it Flow To? The Temporal Matrix and Conceptual Integration" (Vyvyan Evans); "Modeling the Semantics of Geographic Categories through Blendings" (Werner Kuhn); "Collaborative Blending: The Multi-Voiced Creation of Concepts in Professional Work Groups" (Yrjo Engestrom); and "Cognition Under Pressure: Integration, Disintegration, Polarization and Meltdown: A Contribution to Social Science" (Peter Harder). (Papers contain references.) (SM)

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The Way We Think, vol III

Anders Hougaard
& Steffen Nordahl Lund (eds.)

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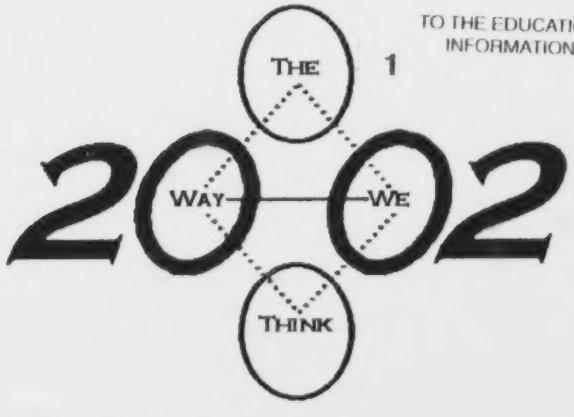

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(lfn@language.sdu.dk)

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Content

Preface i

Agnes Melinda Kovacs & Erno Teglas
Integrating two languages, Theories of Minds, and Executive Functions 1

Alan Cienki
Unconventional Thinking for Speaking: The Blends of George W. Bush 3

Alice Lana
Blends and Alternations in the Grammar
of Brazilian Vernacular Portuguese 5

Annalisa Sannino
Blending as a Ressource for the Study of Conversations
in Complex Settings 7

Barbara Dancygier
Blending and Perspective:
Jonathan Raban's Rravels through Mental Spaces 9

Christine Michaux
How do we Interpret Proverbs? A Conceptual Blending Approach 25

Cynthia M. Grund
Conceptual Integration Networks and Philosophical Theories
Of Meaning: An Exploratory Discussion 27

Erling Wande
The Way Logicians Think? 29

Eve Sweetser
Conceptual Blending and Viewpoint 31

Jesper Sørensen
Piercing Dolls and Burning Hair:
Conceptual Blending in Magical Rituals 35

Joseph Goguen
Generalized Conceptual Spaces, their Morphisms, and their Blends,
With Applications to User Interface Design 37

Joseph Grady
Metaphors as Inputs to Conceptual Integration 39

Kai Kiekhoefer
The Acquisition of the Ditransitive Construction 41

Lawrence Zbikowski
Conceptual Blending and Music 43

Masako K. Hiraga
The Way We Began to Think:
Generation of Abstract Concepts in Chinese Characters 45

Peer Bundgaard, Frederik Stjernfelt, Svend Oestergaard
Outline of a Typology of Compound Noun Blendings 47

Peer Bundgaard, Frederik Stjernfelt, Svend Oestergaard
The Role of Schemata in Compound Noun Blending 49

Rafael Núñez
Creating Mathematical Infinities:
The Beauty of Transfinite Cardinals 51

Roslyn M. Frank
On the Construction of the Concept 'Language':
Entrenched Conceptual Integration Networks Encountered in
Evolutionary Biology and Language Evolution 55

Soichi Kozai
Blending of a Single Event: Integration of Viewpoints 57

Teenie Matlock
Can Conceptual Integration Explain why a Road Can Creep, Go,
or Race 59

Tim Rohrer
It's not just the Way we Think!
Mimesis, Artistic Inspiration and the Blends We Live By 61

Vyvyan Evans
Why Does Time Flow and Where Does it Flow to?
The Temporal Matrix and Conceptual Integration 63

Werner Kuhn
Modeling the Semantics of Geographic Categories through Blendings 65

Yrjö Engeström
Collaborative Blending:
The Multi-voiced Creation of Concepts in Professional Work Groups 77

Peter Harder
Cognition under pressure: integration, disintegration, polarization and meltdown. A contribution to social science 79

Preface

The present publication gives a survey of current research in 'conceptual integration' ('blending'), which was introduced into cognitive science in the early 1990's by Gilles Fauconnier and Mark Turner. In the two volumes which comprise this issue are written version of or abstracts for talks at *The Way We Think*. The first part of the publication contains contributions from the invited plenary speakers, and the second part contains submitted contributions.

The conference is the first of its kind. In the past blending has been dealt with in individual papers and small workshops, and recently in keynote addresses and theme sessions at various larger international conferences (e.g. The International Cognitive Linguistics Conference, 1999 and 2001). *The Way We Think* is the first major international conference focussing on blending, or conceptual integration theory. The motivation for the conference is that blending theory has developed over the last few years into almost a school within a school ('second generation cognitive science'), with practitioners from diverse fields of the humanities and cognitive (neuro-) sciences. The organising committee and the blending community in general think that the time has come for blending theory to be evaluated, explored and challenged at its own major international event, where blending researchers and people with related interests in cognitive science will have the opportunity to meet and discuss.

There is an official website for blending research at:
http://www.wam.umd.edu/~mturn/WWW/blending.html

The editors thank all contributors for their effort and collaboration.

Integrating two Languages, Theories of Minds, and Executive Functions

Agnes Melinda Kovacs & Erno Teglas

Abstract

Various theoretical accounts propose that there is an important developmental and evolutional relation between the theory of mind abilities, language and the executive functions. We are starting from the assumption that the main component of the theory of mind abilities is the understanding of other people's, thus the development of ability to transfer ourselves in the other's belief-system. Moreover, taking the other's mental perspective and the understanding of the reciprocity also constitutes the basic criteria for language-emergence. The aim of the present study is to investigate how the conceptual integration coming from two different languages influences the development of different constructs at early bilingual children, where the language effect is let's say "doubled". Considering that the bilingual children are permanently in contact with and are integrating two languages and two cultures in this early phase of development, the flexibility, which is necessary for the code-switching and for the relativity that allows all things to be expressed in at least two ways, may positively influence their development. The results show important differences between the bilingual and the monolingual group, suggesting that the increased flexibility emerging from the simultaneous use and integration of the two languages can have relevant implications for the development of other constructs.

Unconventional Thinking for Speaking: The Blends of George W. Bush

Alan Cienki

Abstract

Many of the frequent speech blunders by George W. Bush, known as "Bushisms," can be explained as products of blending processes involved in thinking-for-speaking, "the special form of thought that is mobilized for communication" (Slobin 1987 and elsewhere). An analysis of a corpus of attested Bushisms revealed a wide variety of different blending types. However, I will argue that many of them which are nonsensical on the surface are actually characterized by a common phenomenon: unconventional metonymically motivated slippages (Coulson and Oakley 2000). For example, a sentence such as "I know how hard it is for you to put food on your family" violates the idiom "put food on the table" by metonymically substituting another element of the frame: the family of eaters in place of the food. Similarly, Bush's use of improper antecedents ("I understand small business growth. I was one.") results from refer! ence to other elements in a frame that are conceptually salient for the speaker (here: the small business owner), but not yet formally referenced for the listener. The difficulty for the listener lies in the unanticipated deblending that must be performed in order to recreate the speaker's unconventional processes of thinking for speaking.

Blends and Alternations in the Grammar of Brazilian Vernacular Portuguese

Alice Lana

Abstract

Building on the concepts of Argument-Structure Construction (cf. Goldberg, 1995) and Blending as a Grammatical Process (cf. Fauconnier and Turner, 1996) we analyze the favoring of non-standard synthetic causatives in Brazilian Vernacular Portuguese (henceforth BVP) as a part of a wider phenomenon of blending of different argument-structure construction patterns, which constitute semantic frames or schemas for native speakers. This phenomenon manifests itself, on the one hand, in the use of Standard Brazilian Portuguese's intransitive-ergative verbs as causative verbs and vice-versa. Our hypothesis is that this alternation reflects the blending of three argument-structure construction patterns of BVP. This blending process constitutes a productive, conventionalized grammatical process of this language variety. On the other hand, we observe the causativization of agentive verbs, resulting in structures featuring two agents. In such structures the first agent, which occupies the Subject position, characterizes itself as the mediate cause of the event described by the verb. The second agent, which occupies the Object position, is the one that performs the action described by the verb. These structures are blends of two other argument-structure construction patterns, which also constitute a productive alternation pattern in BVP. Such blending processes are conventionalized in BVP and speakers use them expressively.

Blending as a Ressource for the Study of Conversations in Complex Settings

Annalisa Sannino

Blending theory is used here as framework to examine discontinuous and non-linear aspects of conversations in complex settings. The study takes distance from the dominant models that depict conversations as events developing sequentially and in an orderly manner (Sannino, 2002). I will analyze examples of conversations videotaped in a consultative institution of the European Union, responsible for the development of a common opinion. The opinion was worked out by a collective entity which evolved step-by-step in four meetings of twelve, ten, 65, and 212 participants respectively. These individuals had different competences and statuses, they spoke different languages and interacted by the intermediary of interpreters. The opinion materialized progressively as a text written and modified by a reporter. The conversations appear as a heap of units with a particularly complex configuration that does not conform to the classical structures of linguistic exchanges and communicative dynamics. The communicative interaction in this setting constitutes a process which is not directly translatable into ordered sequences of relevant elements. To the contrary, it achieves its goal in a chaotic way that can be articulated around multiple structures developing in parallel. The emergence of these structures may be fruitfully analyzed in terms of conceptual blending.

Blending and Perspective: Jonathan Raban's Travels through Mental Spaces

Barbara Dancygier
University of British Columbia

Extended abstract

In a succession of books recounting his travels and sea voyages in England and the US, Jonathan Raban has perfected a rather special narrative style. His broad and unusually bold use of blended and decompressed images (Fauconnier & Turner 2002, henceforth TWWT) serves the primary purpose of his prose: maintaining his own perspective. Raban's main story lines are interwoven with themes from his past and from the literature he reads in a way which blends various mental spaces, but maintains the writer's unique perspective in the construction of the narrative.

1. Perspective and Identity

I will start with Raban's representation of Identity (TWWT). A particularly interesting series of examples comes from two books, Coasting and Passage to Juneau, where Raban reminisces about his father and their difficult relationship. In (1), he takes the reader back to his childhood days.

(1) For days I had been dreading the arrival of the brown envelope with the Worcester postmark. [...] The boy described in it was lazy. He showed no house spirit, no team spirit, [...]. CO 16

In the passage, Raban's own identity is decompressed along the temporal lines. The "I" of the passage is the adult, the author writing his story. "The boy" is his countepart from over thirty years earlier. Maintaining the first person pronoun to refer to both, as we would do in natural discourse to construct identity, would prevent Raban from making his point - the boy was a different person altogether, perhaps a person whom the present "I" cannot fully understand.

Raban then describes his father. In his description, which is presented entirely from the distance of the present situation, one does not even feel the presence of the Raban-boy character. He is included in the narrative as a source of the father's anguish only.

(2) He was thirty-six. Sitting now in another dusty room, its air thickened with pipe smoke of the same brand, I find myself staring back, puzzledly, at a man much younger than myself . [...] His hair is black and thick, his skin unlined. His preposterously old clothes only serve to underline his youth as he returns my gaze - astonished to find himself the father to this bulky balding fellow in his forties. CO 17

The blend in which Raban's father (as a young man) and his son (as an adult narrator) look at each other almost as if they were strangers is constructed carefully, with shifts of perspective marked by the use of tenses (Cutrer 1994, Fauconnier 1997). The paragraph starts with the description of the father when he was thirty six. Then the narrative shifts to the present perspective (with "now"), and makes the past co-temporal with the present by describing it as a situation the writer is looking at. In the blended "present" there are in fact three characters: the writer, describing the scene, the writer as a boy (referred to as "son"), who remains only in the background, and the writer's father, who can now also see his son, as an adult, and acknowledge his presence.

The blend in which the two men look at each other from the distance of over thirty years removes all the usual closenes of a family relationship. Consequently, the construction of the blend opens the passage to an interpretation whereby the two men are only now getting to know and understand each other. It is apparently Raban's intention to tell the reader that after years of resentment he is only now coming to an understanding of who his father was. The passage which follows elaborates that interpretation.

(3) What I saw across the breakfast table - and saw with the pitiless egotism of the thwarted child - was not my father, it was England. [...] there sat the Conservative Party in person, the Army in person, the Church in person [...].

Seeing him now through different eyes, I find myself watching a sorrowful, lean and angular young man, hopelessly lost for words. [...] He searches the face of his child for a clue as to how to go on [...].

The child is blind to all this. He is putting on the finishing touches to his Bored Aristocrat face. [...]

This was very barefaced stuff. I cared. ... CO 18/19

This passage again starts with the past tense. The point of view is that of the adult writer (now), offering an explanation of the child's behavior, as it is now seen by his adult counterpart (the boy would surely have formulated his thought differently). The next two paragraphs return to the present/past blend (the present tense) in which the father and his son are watched by the writer. Finally, the writer returns to his current evaluation of the past. The sentence "I cared" compresses the two identities (Raban-child and Raban-adult) into one individual again. It is an individual who accepts and understands his past.

As the story recounted in Coasting develops, Raban meets his father and finds himself surprised by the change in his father's demeanor. He has a mental picture of an aging man, a parson, quite conservative in his views, but the man he talks to does not fit the description. This is how Raban describes the experience:

(4) There were two men in my father's chair. One was my contemporary; a cheerful, plainclothes, bearded, radical debunker. I could only see the other, a far older man, if I squinted hard. [...]. While my father talked I tried and failed to get the two men to coalesce into one person, but they wouldn't go. CO 173

The figure of the father is now decompressed along the lines other than time. In fact, because of the change in beliefs, clothes, looks, etc. the father of the story's present, who is really older, is presented as a younger man. The father of Raban's memory, seems now to be "a far older man", because of his seriousness and conservatism. One more time, the mental images Raban is constructing are presented as visual (he could "see" the other man when "squinting"). What is more, the concept of double vision (which is often triggered off by squinting) is used to explain the persistence of the decompression: the two images now facing the writer are too radically different to blend again as they should. It is not often that we see a language user so powerfully aware of the compressions we ordinarily perform, and of the persistence of some
decompressions.

While Raban is on his latest voyage (described in Passage to Juneau), his father dies. When the writer resumes his trip, the vivid memory of his father accompanies him and gives rise to an interesting series of

compressed images. In most of such examples, the haunting memory of the father's looks or views is talked about as physical presence (such cases are compressions along the lines of Intentionality [TWWT]).

(5) The resemblance was dizzying. Weeks would pass before I got used to the fact that my father had shipped himself aboard half the boats in the Alascan fishing fleet. He was the elderly hand, probably the cook, called Pop by the younger crew; [...] It was a strange career move for my father, PJ 310

In (5), the blend is quite elaborate. The writer sees men 'resembling' his father aboard passing boats (which can never get too close, so the illusion is not easily dispersed) and talks about them as 'being' his father. The image is all the more striking because of the fact that the recurring instances inviting the identity illusion all blend into one, since it "is" the father every time.

(6) Along with three purse-seiners and a big crabber, the local gill-netting and trolling fleet had the place to themselves. My father greatly approved. PJ 350

In the instances like (6), the father's views are presented as actually being expressed by him. By simply saying My father would have greatly approved, with the verb forms marking negative epistemic stance (Fillmore 1990), the writer would be setting up a distanced (or counterfactual) mental space Dancygier & Sweetser (forthcoming) in which a deceased man is imagined alive and capable of expressing his views. In the actual text, the imagined situation is presented as real, not counterfactual. As in the other instances, this seems to be the writer's way of marking his point of view. Since he is describing his experience, and not just telling a story, whatever seems real enough from his point of view, is talked about as real, not as counterfactual. Blending imagination and reality, surprisingly, does not make the narrative odd. On the contrary, it adds power and vividness to the story.

The decompression of identity of the type that we saw in (4) recurrs in Raban's narrative and applies to a variety of situations. While (4) would be understood as an example of our changing perceptions of other people, (7) and (8) decompress the identity of the writer himself.

(7) There seemed, in fact, to be two of me. One fellow was crouched in a recess, soberly recording the details of the qat-session for his notebook; the other was skittish and voluble. This second man was trying to make a joke in Arabic - [...] AR 226

In one of his first books, Arabia, Raban describes an incident in the Yemen when he is invited for a session of chewing qat (mildly intoxicating plant, apparently used by the Yemenis on a daily basis). When the drug begins to take effect, his involvement in the situation splits into two levels. On the one hand, he is still the sober story writer, collecting data, on the other hand he is a participant in the social event. As a result of this mental decompression he can retain his narrative point of view. Now that he is no longer "himself", under the influence of the drug, he cannot tell us about the evening unless he extricates his narrator's role from the role of a somewhat drugged man trying to be funny.
In another book, Old Glory, Raban is travelling down the Missisipi in a small boat. His departure is recorded by local TV. He watches the coverage in a hotel room and describes it as follows:

(8) The TV news went local. An Englishman had left Minneapolis that day in a small motor boat [...]. In the picture on the screen his face had a cheesy pallor. [...]. He looked to me like a clowning greenhorn [...] OG 60

The narrative looks as though Raban were talking about another man. First, he quotes (in free indirect style) the expressions used by the newscaster (clearly, the expression "an Englishman" could not be used by Raban himself). Then he talks about the traveller, using third person pronouns. Everything (except the content of the news, of course) suggests that the TV station is talking about someone else. It is only at the end of the paragraph that Raban acknowledges that the man on the screen represents him:

(9) [...] rueful to see myself so travestied by this foolish character, [...]. OG 60

Blending of an object and its representation is a common phenomenon in discourse. In this case the person and his representation are decompressed into independent enitites. The reason is Raban's dissatisfaction with the image on the screen. It simply does not "feel" like him, so, for the purposes of the narrative, it is not him.

Such decompressions apply not only to people. Whenever there are two possible perspectives, they can be presented as two different realities. (10) and (11) illustrate this with respect to places.

(10) The Missisipi was two rivers. They lay right beside each other, but flowed in opposite directions. The steam boats, the fancy Golden Age hotels, the scenic bluffs and gift shops were all going one way, while the river on the charts, with its tows, grain elevators, [...] was going quite another. I had done my share of travelling on the first river, but it was a cute irrelevance compared with the deep, dangerous, epic power of the real Missisipi.

On the second river, the Des Moines River added itself to the stream [...] OG 229

(11) My fellow-diners and I had come at Cairo from different angles, and we'd arrived at different places. They'd flown from Gatwick to the land of the Pharaohs, while I had made a homecoming of sorts from Sana'a. AR 267

The Missisipi river and the city of Cairo are here presented as existing in two independent mental spaces. Where the tourists find traces of history and signs of grandeur, the people who look beyond the glamour of advertising brochures will find different realities that are not exotic at all, but perhaps more true instead. In his own way Raban is telling the reader that what he himself found in those places is a reality which has nothing in common with the tourist perception. As in the other cases, it is his own vision that counts as reality.

The decompressed perceptions are marked with contrasting features. Raban talks about the two rivers flowing in opposite directions – the image that clearly suggests that there is no way to blend the two rivers and have the Delta Queen and a tow travelling on the Missisipi together. In the case of Cairo, Raban's perception is also built on the idea of going in opposite directions. Contrary to those flying in from Europe, he sees his arrival in the city as a return to Europe, because in comparison to other cities of Arabia that he has visited, Cairo feels almost like home.

2. Space, Time, and Change

Raban often travels by boats. He has sailed around Great Britain and through the Inside Passage, he also went down most of the length of the Missisipi River. His descriptions of motion on the water are often striking and in many cases involve creative shifts of perspective. Most people have noticed that watching a far away shore from a floating vessel often creates an illusion of the land moving, and the boat remaining stationary. The illusion is so common simply because water routes do not provide enough landmarks for us to monitor the change in our spatial location. When walking or riding a bike we naturally notice our position changing with respect to landmarks like trees, houses, or street intersections. When sailing, we can only measure our progress with instruments, because the passage from one moving wave to another does not provide sufficient information.

In Raban's stories of sea travel his perspective defines what is moving and what remains stationary:

(12) As islands nearly always do, the Isle of Man came up unexpectedly, in the wrong place. It was steaming straight past my bows like a rusty ship [...]. CO 53

(13) Crab boats, returning to the river at different angles, showed as winking dots of red, white and green. The trouble was that the rest of the world was afloat too. Pubs, cars, lamp-posts and front rooms were bobbing among the crabbers. Observing the international collision regulations, I gave way indiscriminately to nursing homes, Volvos, bungalows and guest houses as they steamed past my bows, ... CO 121/22

In (12) and (13) the land is described as moving past the stationary boat. The added spice of the image in (13) is that the illusion is created by the lights seen from the boat entering the mouth of a river at night. Some of the lights are bobbing up and down because they are marking boats moving up and down on the waves, while some are lights of stationary objects on the shore, which seem to be bobbing because Raban's boat is bobbing. (14) below is similar, but it additionally represents spatial distance between the boat and the island in terms of time required to travel that distance (a rather common case of metonymy, as in The gas station is five minutes away).

(14) Lasqueti and Texada islands were fifteen minutes late, by my reckoning. PJ 161

The shift of perspective represented by (12)-(14) is a result of blending. We can interpret the examples by referring to a generic space in which trajectors are moving past landmarks, and observers located either at the landmark or the trajector can perceive the motion. The first input space in the blends of (12)-(14) has the observer (the narrator) moving along with the trajector (the boat) past the stationary landmark (the land). This is the base space of the story Raban is telling. The other input space has an observer located at the landmark, observing a moving trajector. The blended image assumes the perspective of the second space, with the narrator at the landmark, watching the trajector move by, and imposes it onto the "real" space of the narrator observing a stationary landmark. The point of using such a language in the narrative of travel is not to present the writer as being fooled into the belief that land is in motion, but to impose a different point of view onto an otherwise familiar situation. The blended travelogue has Raban moving past islands and shores as he did before, but from a point of view in which the trajector/landmark relation is reversed. As in the other parts of his texts, Raban's personal perspective is what he describes – a technique which one could dub as "the narrative version of WYSIWYG".

Raban's personal view of the world he travels through also makes him talk about changes he observes as if they were changes he causes. In (15), he is driving south down the interstate on a spring day:

(15) The trees that had been skeletal and grey the day before were coming into leaf this morning [...]. The harder I stepped on the gas, the faster I could make things grow. I made the first magnolia burst suddenly into flower, woke the first snake from hibernation, [...]. At the rate I was going, it would be fall by Tuesday morning. HMH 112

The example resembles sentences like Houses get bigger as you drive towards the shore (see Sweetser 1997), where an observed change in the appearance of a series of objects is described as a gradual change in the objects themselves. They grey trees of "the day before" are not the same trees as those that are coming into leaf on the day of the ride, but the appearance of trees along the road is changing as the driver is entering the warmer areas of the south. The added twist of Raban's image is

compressing change and causation, and presenting the change as caused by his motion through the landscape. Such a blend is characteristic of his style, for it presents the situation just as he sees it.

In another book Raban describes how "seeing" things just one's own way is done. The passage in (16) describes him as a boy, imagining himself on the Missisipi, along with Huck Finn.

(16) if I concentrated really hard, I could see the Missisipi there. First I had to think it twice as wide, then multiply by two, then two again ... The rooftops of Fakenham went under. I sank roads, farms, church spires, [...]. I flooded Norfolk, silvering the landscape like a mirror, leaving just an island here, a dead tree there, to break this lonely, enchanted monotony of water. OG 12

"Seeing the Missisipi there" is using the power of imagination to transform the real landscape beyond recognition. The process described in (16) is in fact a process of consciously blending the reality of a stream somewhere in the English countryside with an image of a huge river, so that one can "see" a different landscape around and pretend to live in it for the duration of the afternoon. In the phrase "I had to think it twice as wide", Raban uses a resultative construction (as in I painted the fence white, [Goldberg 1995]) to portray a mental process which results in a creation of a blended space in which the real stream at his feet can be seen and experienced as the Missisipi. When he subsequently "sinks" roads or farms and "floods" counties, he is simply going through the process of completing the blend in which "here" can be experienced as "there". In spite of the fact that the only aspect of "here" that is projected into the blend is "me at the edge of flowing water", the resulting image is rich enough, because it is experienced from the boy's (Raban's) point of view.

3. Other storytellers, other stories

Raban reads a lot while he travels and the reality of the books often encroaches upon the reality of his trip. In many passages in his books, he shares the same temporal (blended) space with travellers who undertook similar expeditions and whose acounts he has read. In (17), he compresses a period of over a hundred years into a space in which all the writers-travellers are sharing the same temporal space and are following each other spatially (cf. the Regatta blend [TWWT]).

(17) I was not alone. I was bringing up the rear of a long queue of certifiable obsessives. [...] John MacGregor stood at the head of the line. CO 22

The transformation of temporal order into spatial order (although it reverses a common mapping of space onto time) is necessary for the blend to create the sense of a "group", without loosing the sequentiality.

In other instances Raban presents events happening in the book he is reading as coocurring with the events of his journey:

(18) The man in the seat next to me [...]. He was holding a giant panda on his lap, and made it squeak for me. Thesiger's party, meanwhile, was running out of water, and their camels were on the point of death.

At the same time as Thesiger, exhausted, lying low for fear of bandits, at last reached the well at Khaba, our well-fed company, all in delirously high spirits, touched down at Sana'a. AR 199 (he is reading Thesiger's Arabiam Sands)

(19) My companion was buried in her tracts. Martin Chuzzlewit was having a hard time of his transatlantic crossing, and I was sipping sweet airline lemonade from a plastic glass. AR 261

(20) At the Dockside Motel-Pub-Cafe, I plowed happily through the $8.95 turkey dinner. Vancouver {the book} was propped open between the ketchup bottle, verso, and the mustard-squirt, recto. Discovery and Chatham {Vancouver's ships} were moving up the mainland coast, about twenty miles due east of Crofton, [...]. PJ 144

All three examples present the events of the story Raban is reading as coe ing in the same temporal space with the events around him. The reader is of course aware that the statements about Thesiger, Chuzzlewit, or Vancouver's ships describe the content of what Raban is reading as he is sitting on the plane or in a cafe. The blend of the two realities (of Raban's book and of the other books) is necessary, however, to represent jointly all the aspects of the writer's experience at this point in the story. As in the other cases, the narrator's perspective overrides the trivial distinctions between fact and fiction.

Characters from books as well as their authors often appear next to Raban in the stories he is telling, in a yet different type of a fact/fiction blend. In (21), Raban is on a ship going to America. During the journey he reads accounts of the ocean crossing written by 19th century immigrants. Their experience of the journey certainly did not include malt whiskey, hence the feeling of envy emanating from the bookshelf. These travellers are in the physical space of the ship along with Raban, but they are (not surprisingly) confined to the books they have authored. This blend seems to start out with the familar 'authors for works' metonymy Fauconnier 1994), but is then elaborated into the authors being aware of the surroundings in which the books are held.

(21) [...] wondering whether to [...] ask the purser if he could bring me a bottle of Famous Grouse, I felt a tide of resentful envy coming my way from the voyagers on the bookshelf. HMH 7

On other occasions, Raban himself moves into the reality of the book:

(22) I was living inside the book. Because I was more timid and less sociable than Huck, his and my adventures on the Missisipi tended to diverge. He would sneak off in disguise [...]; I would stay on the raft. OG 12

This blend is very carefully constructed. The young Raban has imagined the Missisipi vivdly enough (see [16] above) to be able to experience the reality of the book that inspired the vision. Having entered the reality of the novel he has to coexist with the main character, but cannot interact with him (in preceding sentences Raban says he could not understand Huck's dialect). In the blended space both characters (Huck and young Raban) live on the Missisipi, but the emergent structure does not present them as sharing that space socially; they both experience it at the same time, that's all.

Characters from novels also appear in Raban's prose as representative of roles, not individuals. This seems to be the meaning of (23):

(23) Lunching in a Juice House on the Corniche, I met a young Qatari with a strong reek of whisky on his breath, a fat deck of visiting cards in the breast pocket [...]. I had in fact met him before, in the pages of novels by Thackeray and Trollope, where he appears as a cheerfully idle young rentier who [...]. In Trollope and Thackeray, he is called

Johnny Eames and Pendennis. In the Juice House he introduced himself as Mohammad. AR 107

All the way through "I had in fact met him before" the text leads the reader down the garden path of the usual description of indivduals. But when "he" is projected into the reality of the novels, the reader is forced to re-interpret "I had in fact met him before" as something like I had in fact met this type of man before. The type (or the role) is now a blend of fictitious characters (Eames and Pendennis) and Mohammad in the Juice House. The reference to "him", in turn, has to be reinterpreted as a compression of role and value, with both the role and its possible values existing in the blend of reality and fiction.

4. Representation

In Passage to Juneau Raban is travelling through some of the most beautiful scenery one could enjoy while boating. It is not surprising that the landscape of the Pacific Northwest waterways was often represented in paintings. In (24), Raban gives the reader an entry to the blend he will develop throughout the next paragraphs (PJ 107/8).

(24) Motoring into the San Juans, I felt I'd trespassed rudely into the middle of a painted canvas. [...]

The actual landscape has thus been blended with the paintings representing it, but it remains to be decided which painter's work Raban is boating through.

(25) With its mirror-still water, rocks, and fir trees, its view of distant snowcapped mountains, this was an authentic Bob Ross.

So it is a painting by Bob Ross. In the next sentence, (26), the pronoun "it" refers anaphorically to ...yes, to the blend in which the scenery of the San Juans and Bob Ross's painting are one and the same thing.

(26) I'd seen him paint it one Sunday afternoon on channel 9. [...].

Raban then describes the TV show in which Ross is demonstrating his painting technique.

(27) On his pallette he swizzled up a mixture of Midnight Black, Alizarin Crimson, and Satin Green, then conjured a low promontory of second-growth firs, [...].

For a moment, the reader thinks that perhaps it is only the painting that Raban is talking about. A new feature of the landscape, a promontory, has just entered the description. But the next paragraph begins with the following:

(28) I skirted the promontory, smashing reflections as I went. The foreground trees, paler and more detailed than the rest, were picked out in Sap Green and Yellow Ochre. [...]

"The promontory" Raban is skirting is the one in the picture, but the picture is still blended with the real landscape. The use of the definite article seems to be pointing to the representation, but the action of "skirting" can only be performed in the real world and belongs undoubtedly in the story of Raban's trip. And yet the trees he sees on the shore are not just trees - they were painted in "Sap Green and Yellow Ochre". Having put the reader into the blended reality/representation space, Raban continues in the next paragraph:

(28) Deep inside the gorgeous scene, I lit a Marlboro [...]. PJ 107/8

He just goes on travelling through the blended space. The "gorgeous scene" is the one Bob Ross has created on canvas. But it is also the same scene where Raban is enjoying a cigarette on his boat.

5. Conclusion

The examples discussed throughout the paper suggest some more general conclusions. First, that the compressions and decompressions involved in conceptual integration may additionally be used to provide a locus for a point of view. Blending or decompressing mental spaces gives speakers more options as to which of the spaces thus created will serve as the viewpoint space.

Secondly, we may note that written language may be giving language users more freedom in manipulating mental spaces and integration networks. Most of the examples considered here would be difficult to process in spoken discourse. It could be because the networks constructed are too

elaborate for immediate processing. But it could also be because, along with stylistic features such as free indirect discourse, language phenomena related to the point of view operate differently in written texts. Comparing blending strategies in spoken and written texts could prove an interesting line of research, especially with respect to the representation of viewpoint.

Finally, the evidence from Raban's prose seems to confirm the fact that blending is pervasive in the construction of meaning. Furthermore, part of the appeal of Raban's books comes precisely from his blending wizardry. It may be that integration networks are not just the way we think, but also the way we inspire, surprise, and move.

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How do we Interpret Proverbs? A Conceptual Blending Approach

Christine Michaux

Abstract

In his 96 book, Turner rightly emphasizes the essentiality of proverbs in meaning construction. Because they combine two of our basic forms of knowledge (story and projection), proverbs definitely involve mechanisms fundamental to cognition. This paper will be devoted to the problem of proverb understanding. Taking into account that Conceptual Blending has evolved from Lakoff's Metaphor Theory, my investigation will be twofold. First, I'll propose a critical analysis of the Great Chain Metaphor, i.e. Lakoff and Turner's 89 model for the interpretation of proverbs. Having briefly shown some of the shortcomings of GCM, I will concentrate on the Generic is Specific Metaphor, i.e. the metaphor which maps specific-level schemas onto an indefinitely large number of specific-level schemas that all have the same generic-level schema as source-domain schema. Our investigation of this particular metaphorical mechanism will serve as a bridge to CB, and more particularly to our investigation of the role of the generic space during proverb interpretation. With our analysis of proverb interpretation in CB, we will evaluate to which extent CB allows for a better account of proverbial interpretation than MT. We also hope to shed some new light onto some of the theoretical aspects of CB, and most particularly, on the question of the indispensability of the notion of "generic space".

Conceptual Integration Networks and Philosophical Theories of Meaning: An Exploratory Discussion

Cynthia M. Grund

Abstract

Philosophical theories of meaning from Frege onwards are often preoccupied with the relationships among meaning, intention and intension. If we take as an example those analyses, which employ possible worlds, the issue of intension ends up boiling down extension at possible worlds that are subject to appropriate constraints. Possible worlds have been matters of grave concern for theorists, in and out of philosophy, since they give rise to myriad problems, among which ontology and epistemic access are two of the major ones. One of the reasons I originally was attracted to the notion of the conceptual integration network (CIN) was that at first blush, conceptual spaces seemed be free of at least some of the problems attendant upon possible worlds, but perhaps could be used to lift some of their philosophical payload. I have become increasingly concerned, however, that the theory of CIN's simply may have ignored some hard issues in the discussion of meaning in a philosophical context, which, staying with our example, theories employing possible worlds, for all their flaws, at least try to address. My presentation thus seeks to explore the uses a philosopher, who comes to the theory of CIN's with concerns traditionally of interest to philosophical theories of meaning, may or may not reasonably expect to have for this theory, well aware that these concerns were not the ones which have dominated the development of the CIN-model.

The Way Logicians Think?

Erling Wande

Abstract

In the history of logic there has been for centuries proponents of two different ideas concerning logical processing in the brain. One is that the language of logic proper is abstract and the only way of handling logical problems would be to use algebraic symbols. On the other hand there have been proponents of the conflicting view, according to which spatial evidence were crucial in solving logical problems. An advocator of the fore-mentioned view was Venn, who somewhat ironically, became famous in the history of logic for the so-called Venn diagrams. The last-mentioned view was advocated by, among others, Leibniz and Euler, and in the classical antiquity, Aristotle.

Visual thinking is used by many scientists, reported on, among others, by John-Steiner (1987). The 20th century philosophers on logic seem to have favored the algebraic attitude. Some researchers have interpreted the "spatial analogies" used in logic metaphorically, which may mean that they do not regard analogies as first level phenomena, reflecting primary experience, but second-level phenomena, derived from them. The paper will focus on this controversy, its dichotomical character, and finally on the dual coding theory for language storing and processing, proposed by Paivio (1986).

Conceptual Blending and Viewpoint

Eve Sweetser

Abstract

It is well known that both human cognition, in particular as manifested in language and gesture, is permeated with subjectivity or viewpoint phenomena. I have been building an analysis of deixis and viewpoint in terms of blended spaces. In particular, I see these phenomena as being simpler in certain canonical blended states than they are when broken down into their sub-spaces: they are Primary Blends, based on Primary Scenes (cf. the work of Joe Grady and Chris Johnson) in experience.

For example, all humans have (cf. Clark 1973 and much much work since) differential visual access to the environment depending on distance and on front-back asymmetry of the body; differential manual grasp access, depending on length of arms and front-back bodily asymmetry; and awareness of interactional possibilities presented by another human being. They thus all have the experience of knowing that there are ongoing correlations between the location and position of Ego's body, and:

(1) Ego's manual grasp range, and consequent differential access to objects in different locations closer and farther from Ego, or in front and behind Ego.
(2) Ego's visual field; differing visual access will depend on direction Ego's body is facing, and on location with respect to potential visual barriers.
(3) Ego's potential interaction with other humans nearby; visual and auditory ranges and front-back bodily asymmetry, together with other factors to be discussed below, shape these possibilities.

Humans continuously, at least during waking hours, experience (1)-(3) as correlated. They experience their bodily location and position as inextricably linked to location of Self (as opposed to others), to physical access to environmental affordances, and to visual perspective on the environment. Experience of motion is an experience of constant adjustment of the changing correlations between these affordances.

This is not of course to say that things are always so simple. We start with the fact that we are constantly aware as well that other humans (and animals of some kinds) have similar Primary Blends at work. That is, I know that the person I am facing can't see - or probably reach - the book in

the backpack I am wearing. And I know that the person standing close behind me might be able to reach the book. I can reconstruct pretty well what people near me are seeing, or are able to reach, and I know they can do the same with respect to me.

Deixis seems to be based in these kinds of contrasts. Some have tried to reduce deictic systems to different distances from Speaker (Ego); others include distances from Speaker and Addressee. Bill Hanks' work has shown that there is a good deal of added complexity to these issues: social claims to space, physical access, and all kinds of other factors play into actual decisions to use deictics which are called "proximal" and "distal" in grammars. But the visual and manual access, and relative locations, of Speaker and Addressee, are clearly central parameters in deictic systems crosslinguistically.

So we are also constantly aware of the viewpoint structures of those around us. One aspect of mental space structure, then, is the maintenance of separate Real Space models for Ego and for other participants.

On the other hand, we also seem to have global and synthetic spatial knowledge, alongside egocentric or viewpointed spatial cognition. Steve Levinson's work here has shown up complex contrasts between the two. Once we know a neighborhood or a building well, we know its spatial structure in a way that is not dependent on one or two imagined physical viewpoints. This kind of spatial cognition is also present in our understanding of Real Space (using the term in Liddell's sense of a cognizer's perception and construal of her physical environment). For example, I believe that (pace physical viewpoint) everyone else in the same immediate physical environment can experience it spatially the same way I can. It's not the case that if the book is on the floor in my Real Space, it might be on the desk simultaneously in your accessible experience of the same physical space. This is why I conceive of Real Space as being "the same" for myself and those who share it with me.

Both language and gesture reflect both less-viewpointed and more viewpointed construals, and construals which are more and less explicit of implicit in establishing viewpoint (here the work of Langacker has built up an analysis of degrees of subjectivity which is an important part of my understanding). She is across the table implicitly demands construal as across the table from something or someone, perhaps the speaker; She is across the table from me (or from George) makes the landmark explicit. The interpretation of she is across the table which means that she is across the table from the Speaker (or from the Hearer) is particularly subjective, since one then has to know the location of the speech participants to build up an appropriate mental space. Gesture, for example, is known to have

"agent-perspective" and "global perspective". The former is exemplified in cases where the gesturer in some way enacts the agent, using her own body as a surrogate for the agent's body; the latter is exemplified when, for example, the gesturer uses her hands to set up locations in space, but her own body as a whole is not part of the mapping from Real Space to the content being discussed.

Abstract spaces are equally deictically centered or non-centered. Nuñez and Sweetser have explored the ways in which gesture representing time may make use of Ego's body location to locate the Present, or may simply be locating times relative to each other. A "time-line" spread out from left to right in front of the gesturer, for example, sets up relations of sequence between the times represented, but need not involve any anchoring to Ego's Present. A front-back time-line, on the other hand, with Future in front of Ego and Past in back of Ego (Present is normally just at the front edge of Ego's body), is exploiting the physical deictic center provided by the affordances of the gesturer's body, to create a deictically anchored time line, clearly anchored in the gesturer's present time. (Signed languages appear to universally exploit this mechanism.)

How is it that we go back and forth between egocentric and allocentric, or "neutral", spatial conceptualizations? How do we develop from having one Primary correlation of spatial and viewpoint structures - one relationship between our emotional and cognitive Self, and our physical affordances - to the ability (even the necessity) of projecting our understanding of deictic and viewpoint structure onto ourselves and even onto inanimate objects? Recent theories of mirror neural circuits have been suggested by Katharine Young to provide a basis whereby we essentially "inhabit" each other's bodies to some degree, sharing at least some part of experiential structure willy-nilly with those whom we see experiencing the environment around us.

There has to be some physical experiential basis for projected and displaced viewpoints, since all humans appear to be able to displace the deictic or viewpoint center from themselves. Indeed, most languages readily provide examples such as the English I'll come to your office right away, where the speaker is obliged to shift viewpoint to the addressee's perspective - hence come - if the addressee will be at the office.

The theory of blending provides a way of approaching these issues: children might begin with (1) a Primary Blend of Personal Viewpoint, and (2) some initial startup mechanisms, at least, for experiencing the same kinds of viewpoint structures via other people's actions. Note that (2) does not necessarily mean that the child has "analyzed" or "broken down" the viewpoint blend - rather, some (presumably not all, since the child is not

confused about who is picking up the cup, or who can reach the milk in the fridge and who can't) of the structure of the child's own Primary Blend of viewpoint has been activated. This creates a new blend - a correlation in experience between some aspects of the child's Egocentric Primary viewpoint Blend, and some aspects of a new allocentric structure of spatial understanding (since, as we said, not ALL of the child's Egocentric structures are presumably activated in seeing spatial activity by another).

This is a far cry from the sophisticated ability of English, or Mayan (see the work of John Haviland as well as that of Bill Hanks) speakers to know conventions of their language which tell them when it is appropriate to linguistically prompt a construal from one viewpoint or another. It is also a far cry from the complex artistry of literary and oral narrative viewpoint construction (which character's viewpoint will I assume - though none is in fact visible to activate mirror circuits?). But it may be a start. Blending theory allows us a way to talk about why viewpoint, deixis, and perspective are inherently embodied. They also therefore force us to recognize some differences between these phenomena in different modalities. Signed languages - and gesture too - are enacted by the body more fully than spoken language forms. The signer/gesturer's body is a more fully involved agent in the communicative act in the visual-gestural medium. And although of course speakers in spoken deixis depend constantly on deictic blends involving their bodies, gesturers necessarily place agent-based portrayals in a deictic field with Ego's body as surrogate for the agent's body, and Ego's Deictic Blend as surrogate for the agent's deictic field.

Piercing Dolls and Burning Hair: Conceptual Blending in Magical Rituals

Jesper Sørensen

Abstract

Similarity and contagion have for more than a hundred years been considered fundamental aspects of what is commonly known as magic. Recognised by Roman Jakobson to equal the tropes of metaphor and metonymy respectively, recent research into underlying cognitive processes can be used to shed new light on magic. A cognitive perspective on magic will focus on how mental structures are used to construct certain ritual settings in which metaphors and metonymies are used, not only for making sense of the world, but in order to manipulate the world. Thus ritual actions expose a wide range of modal instantiations of the same mappings, from physical actions to natural language. Through an empirical presentation of a Trobriand magical ritual based on the theory of conceptual blending, I will outline some of the ways in which metaphor and metonymy are employed in ritual practices represented as having an impact on the physical world by the ritual participants. Thereby I hope, not only to get closer to an adequate explanation of magic, but at the same time to help expand our general knowledge conceptual blending as general cognitive process and strategy.

Generalized Conceptual Spaces, their Morphisms, and their Blends, with Applications to User Interface Design

Joseph Goguen

Abstract

We give a precise mathematical definition for a generalized notion of conceptual space, which includes types, typed operations for forming new concepts and relations from old ones, and axioms. we give examples including some simple user interface displays having interesting structure. We give a precise mathematical definition for an appropriate notion of morphism between such spaces, with examples from user interface design and information visualization; the examples show that this notion must be partial in several different ways. We argue that user interfaces and information visualization are such morphisms, and we give some quality measures that are appropriate for our applications. We develop a precise mathematical theory of blending for our generalized conceptual spaces, relying on the fact that these spaces with their morphisms form a special kind of ordered category, and arguing that blends are a special kind of colimit in such a category. Finally we prove a number of mathematical properties for this notion of blending, and show that they are both intuitvely plausible and useful in practice.

Metaphors as Inputs to Conceptual Integration

Joseph Grady

Abstract

Conceptual metaphor theory (CMT) as practiced since Lakoff and Johnson has achieved breakthroughs by focusing on ways in which entrenched, conventional metaphoric patterns pervade thought and language. Blending theory (BT), on the other hand, has yielded a new body of findings by exploring mechanisms which allow us to produce a spectacular variety of new conceptualizations "on the fly." While CMT acknowledges "one-shot" metaphors and BT recognizes both the entrenchment of blends and a role for pre-existing templates which guide integration, the major works in the two frameworks create sharply contrasting impressions of the relative importance of stored patterns vs. the capacity for spontaneous generation. In this talk I will discuss the interaction between the two in conceptual integration - ways in which the real-time process of creating new metaphorical blends depends on entrenched conceptual correspondences, and implications of the relationship between these two dimensions of cognitive activity.

The often-discussed relationship between the conceptual domains of emotion and temperature provides an example of the important role of stored patterns. In numerous, diverse languages, common words for 'cold' also have conventional senses referring to indifference - e.g., Lat. *frigus*, Arab. *buruuda*, Indon. *dingin*, Chin. *le ng*, Old Ir. *úar*. What is the 'outer space relation' that motivates the connection between coldness and lack of emotion in these metaphorical usages, or in a blend like "We received a chilly reception?" The most plausible account refer to any connection such as similarity, analogy, or cause-effect which directly links two input spaces; rather the connection is licensed by an established conceptual association between coldness and a lack of feeling, itself motivated by the connection in experience between emotion and skin temperature. This pattern and others like it (primary metaphors) demonstrate that Correlation is a relationship which is integral to a vast number of blends. Furthermore, there are reasons to question whether the licensing patterns themselves arise as blends, or as conceptual associations on a different order.

Additional issues considered in the talk include the idea that Perceptibility (i.e. accessibility via particular faculties of perception) is a guiding principle for blends in the same spirit as (or possibly as an aspect of) compression to human scale; and under what conditions correlated

concepts may give rise to entrenched metaphorical correspondences. (For instance, the CMT notion of Invariance does not apply to these patterns; instead, properties such as coldness and indifference share a generic structure at a level even more abstract than image-schemas.)

The Acquisition of the Ditransitive Construction

Kai Kiekhoefer

Abstract

The cognitive processes that underlie learning, using, and interpreting linguistic units consist of forming representations. These representations are mental spaces: partial assemblies containing elements and internal connections, motivated and structured by frames and cognitive models. How do children come to form the various entities and relations of these configurations ? Our study is based on high density developmental corpora of two children learning English (T) and German (A) between age 2 and 3. Focusing on the ditransitive construction, we investigate how a particular constructional type emerges and develops during ontogeny. We trace the developmental path of ditransitive verbs and suggest that what characterizes the children's spaces is: i) the item-based nature and concreteness of elements and relations in an individual space and in the space-structuring frame; ii) the systematicity in the gradual appearance of more abstract conceptual domains; and iii) evidence for very specific metaphoric blends even at this early age. In addition, we analyze the preeminent role of language input providing the learner with important prompts for space configuration, and re-analyze the role of 'selective projection' given the children's still developing conceptual knowledge. Finally, we discuss the apparent absence of 'deblending' operations during this period.

Conceptual Blending and Music

Lawrence Zbikowski

Abstract

In their pioneering work on conceptual blending Mark Turner and Gilles Fauconnier have made a persuasive argument for the importance of blending as a general process manifested throughout human cognition. In this presentation I describe the part conceptual blending plays in our understanding of music. I begin with a brief account of how categorization and cross-domain mapping give rise to musical concepts. I then show how musical concepts combine with concepts from other domains to create new meaning, most typically through double-scope conceptual integration. Specific examples are drawn from the groove as it is manifested in popular music, from nineteenth-century Lieder by Franz Schubert and Robert Schumann, and from the discipline of music theory. I conclude with general observations on the use of conceptual blending as an analytical tool to explore syntax in music and in language.

The Way We Began to Think: Generation of Abstract Concepts in Chinese Characters

Masako K. Hiraga

Abstract

This paper claims that Chinese characters present an ideal case for understanding how the ancient Chinese mind conceptualized abstract meanings by blending. By analyzing the etymology of compound ideograms as a database, the study demonstrates that meaning generation in compound ideograms is manifested as a conceptual integration through creative blends, as opposed to compositional explanation (cf. Hiraga 2000). Compound ideograms consist of two or more radicals, which are pictograms or ideograms. The meanings of the radicals constitute input spaces for the blend by means of iconicity and metonymy. For example, the meaning of the character brightness comes from the blend of the pictograms of window_and moon. The moon then functions as a metonymy for moonlight. The blend mixes the meaning of window and moonlight, and produces moonlight through the window. The blend further elaborates a more abstract meaning of brightness, based on the CAUSE-EFFECT metonymy. The blending process of some prototypical compound ideograms is analyzed in terms of iconicity, metonymy, metaphor, inference, and background knowledge. Compound ideograms are a fossil of conceptualization, through which we can see how the human mind three thousand years ago began to conceive and record abstract concepts by the blend of concrete entities.

Outline of a Typology of Compound Noun Blendings

Peer Bundgaard, Frederik Stjernfelt, Svend Oestergaard

Abstract

The appreciation of the role of generic schemata in compound noun blending leads to the question of the possible existence of a typology of such schemata. Traditional linguistic semantics often has made such typologies, even if on an ad hoc basis. This paper outlines a reasoned typology of compound noun subtypes which leads to general conclusions as to the anatomy of blending as such.

The Role of Schemata in Compound Noun Blending

Peer Bundgaard, Frederik Stjernfelt, Svend Oestergaard

Abstract

Abstract: The role of schemata in compound noun blendings has been given too little attention. Thus, it will be argued that some of the core contrast examples leading to the hypothesis of blending's creative character ("Fire station"/"railway station" and "fire safe"/"dolphin safe") can be analyzed in more detail from the assumption that they constitute different emphases of one and the same basic narrative function schema. This points to a revaluation of the role of "generic space" in blending theory.

Creating Mathematical Infinities: The Beauty of Transfinite Cardinals

Rafael Núñez

Abstract

The Infinite is one of the most intriguing ideas in which the human mind has ever engaged. Full of paradoxes and controversies, it has raised fundamental issues in domains as diverse as theology, physics, philosophy, and literature. Strangely enough, an elusive and counterintuitive idea such as the infinite has played a central role in defining a fundamental field of human intellectual activity characterized by precision, certainty, objectivity, and effectiveness in modeling our real finite world: Mathematics! Particularly rich is the notion of actual infinity, that is, infinity seen as a "completed thing." Without actual infinity, mathematics, as we know it, would simply not exist.

From the point of view of Cognitive Science and conceptual analysis several questions come to mind: Where does the infinite come from? What cognitive mechanisms make it possible? How do we grasp the infinite if, after all, our bodies are finite, and so are our experiences and everything we encounter with our bodies? How an elusive and paradoxical idea structures an objective and precise field such as mathematics? Why the various forms of infinities in mathematics have the exact conceptual structure they have? Based on findings in Conceptual Metaphor and Blending Theories, and building on the work I have done in collaboration with George Lakoff, I will propose some answers to these questions. I will first analyze what various actual infinities in mathematics have to do with each other (e.g., points at infinity in projective geometry, infinite sums, mathematical induction, infinite sets, limits), showing that they all are particular forms of actual infinities generated by a single human everyday conceptual mechanism: the BMI (the Basic Metaphor of Infinity, or Basic Mapping of Infinity as a form of conceptual blend). Second, I will analyze in more detail a particular kind of actual infinity, namely, transfinite cardinals and transfinite arithmetic, as conceptualized by the brilliant German mathematician of the 19th Century, Georg Cantor. Cantor created a very precise and sophisticated hierarchy of infinities that opened up entire new fields in mathematics giving shape, among others, to modern set theory. Many counterintuitive and paradoxical results follow from his

work. In these talk I will try explain the cognitive reasons underlying such paradoxes and the agitated disputes they generated among mathematicians.

45

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On the Construction of the Concept 'Language': Entrenched Conceptual Integration Networks Encountered in Evolutionary Biology and Language Evolution

Roslyn M. Frank

Abstract

In recent years the relationship between language change and biological evolution has captured the attention of investigators operating in different disciplines, particularly evolutionary biology and ALife (Zeimke 2001, Hull 2001), as well as linguistics (Croft 2000; Sinha 1999), with each group often bringing radically different conceptualizations of the object under study, namely, 'language' itself, to the debate. Over the centuries, meanings associated with the expression 'language' have been influenced by mappings of conceptual frames and inputs from the biological sciences onto the entity referred to as 'language'. At the same time the prestige of the 'science of linguistics' created a feedback mechanism by which the referentiality of 'language', at each stage, was mapped back into the field of evolutionary biology along with the emergent structure(s) of the resulting 'blend'. While significant energy has been spent on identifying ways in which biological evolution has been linked to concepts of language evolution (Dorries 2002), little attention has been directed to the nature of the conceptual integration networks that have been produced in the process. This paper examines the way conceptual integration theory can be brought to bear on the 'blends' that have been created, focusing primarily on examples drawn from recent debates, e.g., 'language' viewed as 'a lingueme pool' (Croft 2000).

Blending of a Single Event: Integration of Viewpoints

Soichi Kozai

Abstract

It is well-known that blending is the integration of several events into a single unit (Fauconnier & Turner 1996, Coulson 1997, Turner & Fauconnier 1998). However, there are cases where blending occur in association to a single event. In this study a comprehensive analysis of such blending will be presented using the Mental Space (Fauconnier 1994, 1997) notion of viewpoint. Consider examples below, which show integration of viewpoints between the interlocutors: (1) I'm your mother, aren't I? (2) *She's your mother, aren't she? It is acceptable to use the auxiliary 'are' with a first-person pronoun, while unacceptable with a third-person pronoun. What is focused here is the subject referent's being hearer's mother. When a conversation takes place, two types of viewpoint are present; one is the speaker's and the other hearer(s)'. From hearer's point of view, the first-person form 'I' indicates the second person, whereas the third-person form 'she' remains indicating the third person. Thus, the use of auxiliary 'are' becomes legitimate with a first-person pronoun subject. More intricate viewpoint integration involving viewpoint of third-person referent is available in Japanese, and those examples will be accounted for, with a cognitive factor, 'time', within the framework of Mental Space theory.

Can Conceptual Integration Explain why a Road Can Creep, Go, or Race?

Teenie Matlock

Abstract

Cognitive linguists argue that language users mentally simulate motion with sentences such as (1a) (Fauconnier, 1997; Langacker, 1986; Talmy, 2000). Yet, until recently, there was no psychological evidence to support this idea. (1a) The road goes through the park In recent psycholinguistic work, I found that readers took longer to process sentences like (1a) after being primed with slow-travel information than after being primed with fast-travel information. Similar results arose with far-/short-distance travel and cluttered/non-cluttered terrain, suggesting that
simulated motion is part of language understanding and that it mirrors real motion (Matlock, 2001). In the talk, I present new data from experiments that had people sketch sentences such as (1a). I discuss how the data provide further evidence for simulated motion (e.g., longer trajectories for fast motion). I focus on consistent but seemingly peculiar results relating to motion depiction in static images. A good example is that more vehicles were drawn when sentences were primed with fast-motion information. One explanation is that differences are random. Another points to conceptual integration (e.g., Fauconnier & Turner, 1997). Specifically, more motion elements emerge due to
more motion enactment and recruitment during integration. Both possibilities are discussed.

It's not just the Way we Think!
Mimesis, Artistic Inspiration and the Blends We Live By

Tim Rohrer

Abstract

A central reason why cognitive semantics is more appealing than traditional referential semantics is that both metaphor theory and blending theory provide insight into what we ordinarily find meaningful as we live our lives. Blends are useful in our everyday reasoning, embedded into our tools and instruments, one of the primary mechanisms which engender the humor, sarcasm, slang and puns of ordinary conversation, ubiquitous in writing and art. Yet much of what we have done thus far as blending theorists has been to develop a theory of interpretation. We talk about our reactions to art, analyze the mimesis we feel when we undergo its creation, but what do we have to say about the phenomenology of the creative act itself?

In this talk I will develop a blending-inspired theory of artistic creation, as opposed to artistic explanation. The immediate hurdle is that creativity is a privileged process to which most of us, acting as academic researchers, do not have direct access and hence find it easier to resort to studying the process of interpretation, the responses as an art-viewer. I propose to overcome this obstacle in a number of ways. I will weave together first-person narratives on the act of artistic creation from Magritte, Mario Vargas Llosa, John Gardner and others, my experiences working with youthful Colorado poets responding to the events of 11 September 2001, introspective analyses of my own experience as a poet, and more conventional analyses of multiple interlinked artworks such as the adaptation of a novel into a screenplay and movie. My examples will include material from Vargas Llosa's Tia Julia y El Escribidor, the film Tune in Tomorrow, Edwin Abbott's Flatland: A Romance of Many Dimensions, Karen Salmansohn's How to Make Your Man Behave, in 21 Days or Less, Using the Secrets of Professional Dog Trainers, numerous anonymous internet humor pieces, cartoons and comics as well as high canon visual art. By focusing on the processes of elaboration and mapping of blending theory as they operate during creative thought, I will argue that the key component of creativity is the heightened sensuality which cross-domain mapping produces. I will then discuss how this hypothesis is consonant with recent experiments in cognitive neuroscience by myself

and others which argue that the sensory and motor regions of the cortex show increased responses during cognitive tasks.

Living in the blend requires living in a state of the heightened sensuality; this is the well spring of artistic creativity.

51

Why Does Time Flow and Where Does it Flow to? The Temporal Matrix and Conceptual Integration

Vyvyan Evans

Abstract

Abstract: This paper applies blending theory to one conceptualization of time, what I term the Temporal Matrix Model (TMM). In this conceptual model time constitutes the event which subsumes all others, e.g., "All things happen in time"; "Time flows on forever"; etc. This model is so entrenched in the way we think that in physics, for instance, the TMM constitutes an empirical and a theoretical primitive. Newton's view of Absolute Time (an instance of the TMM) underpinned his theory of mechanics. Even in modern physics where time is no longer absolute, time is still construed as a matrix, constituting the physical fabric of reality. In this paper I show that rather than corresponding to an aspect of a putatively "objective" reality, the temporal matrix is a spectacular example of a conceptual blend. The phenomenological experience of duration (which may ultimately be traced to temporal codes at the neurological level), and the correlative awareness of physical succession derived from experience with the world, are composed in the integration network. The emergent property of the blend is an entity, infinite in nature, which is independent of anything else. Hence, the TMM constitutes a temporal matrix which serves as template for "measuring" ongoing experience.

Modeling the Semantics of Geographic Categories through Blendings[1]

Werner Kuhn
Institute for Geoinformatics, University of Muenster
Robert-Koch-Strasse 26-28, D-48149 Muenster, Germany
kuhn@ifgi.uni-muenster.de
http://ifgi.uni-muenster.de

Abstract. We develop an algebraic formalization method for blends in geographic categories, using the classical example of houseboats and boathouses. The approach extends previous formalizations with image-schematic and affordance-based structure. An implementation in the functional language Haskell tests the theory and demonstrates how it generalizes to a powerful paradigm for building ontologies for information systems.

1. Introduction

The overall goal of our work is to formalize the semantics of geographic information in order to improve the usability of this information in information infrastructures. This paper addresses the question how the semantics of categories in geographic information can be modeled, using the notion of conceptual integration or blendings (Turner and Fauconnier 2001). Our approach is closely related to Goguen's (2001) formalization, but differs from it by

[1] Excerpt from http://ifgi.uni-muenster.de/kuhn/publications/KUHN_Modelling_Semantics.pdf. See also Geographic Information Science-Second International Conference GIScience 2002, M. Egenhofer and D. Mark (eds.), Lecture Notes in Computer Science Vol. 2478, Springer, Berlin.

- starting from an existing (semi-formal) semantic theory (that of WordNet);
- emphasizing the semantic role of *function* (affordances provided by an instance of the category) in mappings among conceptual spaces;
- attempting to achieve *total* (rather than partial) *semantic mappings* by introducing finer-grained conceptual spaces;
- identifying *spatial* structures (image schemata) in the integrated conceptual spaces for higher level abstractions
- using the *functional programming language* Haskell (Peterson, Hammond et al. 1997) as a more general formalization device.

2. Case study

A classical example of conceptual integration that has been analyzed in some detail is the combination of the mental spaces house and boat in two different ways, to arrive at *houseboat* and *boathouse* (Goguen 1999). This section describes the conceptual integration informally. In order to build on an established informal semantics of the blended spaces, we use the two concept hierarchies from WordNet (Fellbaum 1999) as a starting point.

2.1. Boathouses and houseboats in WordNet

After reducing WordNet's synsets (sets of synonymous terms) to a single concept and eliminating irrelevant parts of the glosses, the hypernym hierarchies for boathouse and houseboat, respectively, are the following:

boathouse -- (at edge of river or lake; used to store boats)

=> **house** -- (a building in which something is sheltered or located)

=> **building** -- (a structure that has a roof and walls and stands more or less permanently in one place)

=> **structure** -- (a thing constructed; a complex construction or entity)

=> **artifact** -- (a man-made object)

=> **object** -- (a physical (tangible and visible) entity)

=> **entity** -- (anything having existence (living or nonliving)).

houseboat -- (a barge that is designed and equipped for use as a dwelling)

=> **barge** -- (a boat with a flat bottom for carrying heavy loads (especially on canals))

=> **boat** -- (a small vessel for travel on water)

=> **vessel** -- (a craft designed for water transportation)

=> **craft** -- (a vehicle designed for navigation in or on water or air or through outer space)

=> **vehicle** -- (a conveyance that transports people or objects)

=> **conveyance** -- (something that serves as a means of transportation)

=> **instrumentality** -- (an artifact that is instrumental in accomplishing some end)

=> **artifact** -- (a man-made object)

=> **object** -- (a physical (tangible and visible) entity)

=> **entity** -- (anything having existence (living or nonliving)).

Some observations about WordNet's two conceptual hierarchies are in order:

1. They are both unique, i.e., there is only one sense each for boathouse and houseboat. Given the specificity of the concepts, this is not surprising;
2. Within this single sense, they are both strict hierarchies, as is the case for all WordNet noun hierarchies (each noun has only one hypernym);

3. They both contain one of the two blended concepts early in the hierarchy (house and boat, respectively, delivering the basic affordances of shelter and river transportation).
4. The other blended concept, describing the afforded entity, is explicitly (boats) or implicitly (dwelling) contained in the glosses;
5. Glosses at lower levels tend to use functional descriptions ("used to store boats", "for travel on water"), while those higher up in the hierarchies are not only more abstract, but also defined independently of function;
6. There appears to be a "change of gears" in the abstraction at a certain point in both hierarchies: when going from building to structure and from conveyance to instrumentality, the kinds of concepts and their definitions become significantly more abstract;
7. Above level 5 of the boathouse hierarchy and level 9 of houseboat (artifact), the two hierarchies are identical;
8. There is a case of a spatial relation being used as a defining property (boathouses are "at edge of river or lake").

2.2. An informal blend

Taking WordNet's two conceptual hierarchies, we now produce informal semantics for boathouses and houseboats, consisting of conceptual spaces and mappings between them. This model departs from WordNet's paradigms in several ways; it

- models the meaning of each conceptual space by the functions (affordances) its instances provide;

- maps the entire set of affordances from a super-concept to a sub-concept (total mappings);
- uses another kind of conceptual spaces (image schemata) at the higher levels of hierarchies;

We give a purely functional description of each conceptual space in which the meaning of a concept is determined by the functions that its instances afford to humans. Many discussions of conceptual integration implicitly use the notion of *affordances* (Gibson 1986) in their selection of mapped features (Goguen 1999). Recent work in cognitive psychology further supports the adoption of a functional view in the construction of ontologies (Barsalou, Sloman et al. 2001).

Each synset of WordNet potentially constitutes a conceptual space. Its structure is composed of components specific to itself and components inherited from other conceptual spaces. The decision on how finely grained the conceptual spaces should be seems arbitrary. Goguen uses a minimum of conceptual spaces: house, boat, houseboat, boathouse, and a generic object. His semantic mappings need to be partial, because the conceptual spaces are rich in structure and not all of their structure is passed on in all mappings. We retain only those synsets that play a role in distinguishing boathouses from houseboats and allow for total mappings.

Another departure from the WordNet conceptual hierarchy is the introduction of *image schemata* at higher levels. In particular, the *container* schema is invoked as a source of house semantics (sheltering being interpreted simply as containment). Similarly, the *surface* schema is chosen to capture the affordance of boats to carry loads, and the *path* schema to capture their motion. Finally, the *contact* image schema offers

ture their motion. Finally, the *contact* image schema offers the spatial relation stated for boathouses ("located at the edge of a river or a lake"): the boathouse needs to be adjacent to a water body for the boats to reach it.

After these modifications, we are left with the following shorter list of conceptual spaces from WordNet. Their descriptions first repeat the glosses and then express them by affordances inherited from other concepts and image schemata:

A **boathouse** is a house used to store boats, located at the edge of a river or a lake.
It inherits the *sheltering* affordance from **house** (applying it to boats) and the **contact schema** attaching it to a **water body** (which in turn is used as a generalization of rivers and lakes).

A **house** is a building in which something is sheltered or located.
It inherits the *containment* affordance from the **container schema**. To simplify, we drop the **building** concept from the model, as it only serves to specialize the kind of container ("a structure that has a roof and walls") and to state the absence of a mobility affordance ("stands more or less permanently in one place").

A **houseboat** is a barge that is designed and equipped for use as a dwelling.
It inherits the affordances to *travel on water* and to *carry heavy loads* from **barge**. It further inherits the *sheltering* (serving as a dwelling) affordance from **house**, applying it to humans. (WordNet defines a dwelling as "a physical structure (e.g., a house) that someone is living in".)

A **barge** is a boat with a flat bottom for carrying heavy loads (especially on canals).
It inherits the *water travel* affordance from **boat**. We ignore the property of flat bottoms (being a design feature to permit the affordance), as well as the prototypicality for canals.

A **boat** is a small vessel for travel on water.

It inherits the *water transportation* affordance from **vessel**, applying it to humans (which turns transportation into travel). We ignore the qualification "small".

A **vessel** is a craft designed for water transportation.

It inherits the *transportation* affordance from **vehicle**, applying it to water as a medium. We drop the craft concept, as it only introduces alternative media (such as air).

A **vehicle** is a conveyance that transports people or objects.

It inherits the *motion* affordance from the **path schema** and the *support* affordance from the **surface schema**. We drop the conveyance concept, as it seems not to provide any further generalization (transportation can only be for people or objects anyway).

3. Formalization

Our formalization serves two purposes: it is a basis for implementing geographic information services and a test of the completeness and consistency of the theory. We use the functional language Haskell to provide a minimal, executable theory of the semantics of houseboats and boathouses. We limit ourselves here to the use of (parameterized) type classes, representing categories as the set of types sharing some behavior (having common affordances). The details of type instantiations are omitted.

We begin with the four required image schemata: container, surface, contact, and path. For the sake of simplicity, we do not structurally distinguish the container from the surface schema. Each image schema is specified as a type class with one or two parameters. For example, `Containers a b` stands for all container types `a` holding things of type `b`. The

operations afforded by the types in the class are described through their signatures. For example, the `insert` operation combines a thing of type `b` with a `container a b` and returns the `container a b` (now holding the thing).

```
class Containers a b where
        insert :: b -> a b -> a b
        remove :: b -> a b -> a b
        whatsIn :: a b -> [b]

class Surfaces a b where
        put :: b -> a b -> a b
        takeOff :: b -> a b -> a b
        whatsOn :: a b -> [b]

class Contacts a b where
        attach :: b -> a b -> a b
        detach :: b -> a b -> a b
        whatsAt :: a b -> [b]

class Paths a b c where
        move :: c -> a b c -> a b c
        origin, destination :: a b c -> b
        whereIs :: a b c -> c -> b
```

These image schemata will take care of the spatial relations in the theories of boathouses and houseboats: Houses shelter people or, as boathouses, boats (container); boats move on water bodies (surface and path); and boathouses are located at water bodies (contact). These constraints will be used in the derivations of these classes below.

Next we introduce the three auxiliary concepts required beyond the WordNet hierarchies: people (to become house inhabitants and boat passengers), water bodies (as transportation media) and heavy loads (as defining capacity of barges). All three are treated as constants, as their internal structure is irrelevant for the explanation of boathouses and houseboats. Water bodies are derived from surfaces, which is expressed as a so-called

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class constraint or context in Haskell (=>). The meaning is that all `WaterBodies` need to be `Surfaces`.

```
class People p
class HeavyLoads l
class Surfaces w o => WaterBodies w o
```

Next, we supply the formal definitions for all conceptual spaces retained in the two WordNet hierarchies above the target concepts. While the first (above boathouse) is completed by the simple derivation of houses from containers,

```
class Containers h o => Houses h o
```

the second hierarchy involves a longer inheritance chain. Vehicles are first derived from surfaces (affording to ride on the vehicle) and paths (affording motion). They end up with parameters for the type `o` of the transported object, the type `a` of the path, and the type `b` of the origin and destination places. (Note that the letters used for the parameters have only mnemonic significance; all that counts for the model is the class constraints imposed on the parameters.):

```
class (Surfaces v o, Paths a b (v o)) => Vehicles v o a b
```

Vessels are defined as vehicles for water transportation, inheriting a slot for the

type `w` of water body:

```
class (Vehicles v o a b, WaterBodies w (v o))
       => Vessels v o a b w
```

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Boats are vessels for travel, constraining the type of transported objects o to people p:

```
class (Vessels v p a b w, People p) => Boats v p a b w
```

Finally, barges get the additional constraints that their loads are heavy:

```
class (Boats v p a b w, HeavyLoads p) => Barges v p a b w
```

Now, the two target concepts can be derived from their immediate super classes. Boathouses are houses used to store boats; thus, the type o of the sheltered object is constrained to a boat v (as defined above). Furthermore, they are located at the edge of a water body, namely the one (w) on which the boats can move; thus, a constraint for contact, attaching the boathouse to the water body, is introduced:

```
class (Houses h (v p), Boats v p a b w,
       Contacts w (h (v p)))
       => BoatHouses h v p a b w
```

Houseboats are barges used as dwellings, i.e., as houses for people, The barges thus
inherit the behavior of houses:

```
class (Barges v p a b w, Houses v p)
       => HouseBoats v p a b w
```

The Haskell code given so far is complete and type checked. With instantiations for types of boathouses and houseboats, values can be declared and axioms stated and evaluated to demonstrate semantic properties and differences. For example, it can be shown that a passenger on a boat in a boathouse cannot be said to be an inhabitant of that house, while a passenger on a houseboat can.

4. Conclusions

The informal description of the category hierarchies derived from WordNet and the formalization in Haskell show that the theory of conceptual integration provides a compatible and powerful paradigm for semantic modeling.

Key characteristics of conceptual integration theory are its reliance on multiple inheritance and (implicitly) on functions to capture the meaning of conceptual spaces. We have taken the notion further by using total mappings (imposing constraints on the granularity of integrated concepts) and affordances as core semantic properties.

Future work will need to demonstrate that the given formalization for semantic mappings is powerful and general enough to deal with a relevant subset of the semantic problems in geographic information science.

Acknowledgments

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Collaborative Blending: The Multi-voiced Creation of Concepts in Professional Work Groups

Yrjö Engeström

Abstract

Conceptual blending theory can be used a framework to analyze discourse in professional groups involved in redesigning and re-conceptualizing their work. Such an effort poses a number of analytical challenges: How can episodes and strings of blending be reliably identified in multi-party conversations distributed over several meetings and lengthy periods of time? What are the properties of blends produced by bringing together multiple inputs produced by participants representing different points of view? Can blending take the form of argumentation and negotiation - and how are these related to the processes of composition, completion and elaboration? I will analyze videotaped discourse data from so called Change Laboratory sessions (Engeström & al., 1996) conducted with physicians from hospitals and primary care clinics in Helsinki. The physicians generated the novel concept of 'care agreement' which is being implemented as a new practice of care coordination in the health care system of Helsinki (Engeström, 2001, in press). I will employ Bakhtin's (1986) ideas of dialogicality as a complementary resource in the analysis, aiming at an integration of his framework and the theory of conceptual blending.

Cognition under pressure: integration, disintegration, polarization and meltdown.
A contribution to social cognitive science

Peter Harder
University of Copenhagen

Introduction

The point of this paper has to do with conceptual disintegration – the logical counterpart to blending that Anders Hougaard (cp. Hougaard 2002) has recently put on the agenda. Understanding the twin operations of integration and disintegration is one project with two prongs; and because of the very basic nature of these operations, it is difficult to see what is *not* affected by this question. As po' ted out by Bache (2002) there is therefore a 'ubiquity' question that needs to be addressed: in their most schematic form, conceptual fusion and splitting are so general operations that a theory pursuing that issue *per se* is at risk of being a theory of everything. The argument below takes its point of departure in cases which have stood as exemplars of what blending is – i..e. cases like the riddle of the monk, of land yachts, of the philosopher's discussion with Kant, which are termed 'three-star blending' below. The specific features of that case are then contrasted with other situations that involve both integration and distintegration. The central feature in the account below is that the most sophisticated and demanding form of conceptual integration is associated with the ability to handle situations with contradictory specifications.

The main point concerns a kind of situation where integration and disintegration is of focal interest and challenges more simple approaches to

mental structure-building and construal. It also involves the relationship between cognitive processes on the one hand and emotional and social processes on the other. As a key example, I take up the challenge to cognitive science that was created by President George W. Bush, when he said that he considered Ariel Sharon a man of peace. A proper understanding of this utterance may conceivably be a matter of life and death, so there are good reasons why cognitive science should work on it. The notion of conceptual meltdown is designed to evoke a picture in which there are crucial elements of integration as well as disintegration.

1. 'Differentiation' vs. 'integration' – and the basic path of complexity

The path I am taking presupposes that the way we think should be understood in terms of interplay between the environment and the cognitive subject (cf. section 2 below). It should also be understood in terms of a scale of complexity going from an 'elementary' end to a 'sophisticated' end. I assume (cp. Harder 1999, fc), that understanding cognitive mechanisms entails understanding where they belong on a scale of sophistication – as well as understanding how they depend on those more elementary mechanisms which they presuppose.

In the case of conceptual integration and disintegration, I therefore agree with Bache (2002) in stressing the desirability of a distinction between several 'orders' of blending operations belonging at various levels of complexity. 'Disintegration' has a loaded reading suggesting that a state characterised by a higher degree of order is replaced by a more chaotic state, cf. below. I therefore use *differentiation* as a general term for the

logical opposite of integration – the process whereby something is filtered out from a complex whole, based on a principle which makes it 'different' from the rest.

'Differentiation' (as a skill) must be understood in the context of 'difference' as a property of the environment. The surrounding world is constituted so as to offer different 'affordances' to living organisms, cf Gibson (1966). But differential reaction is not inherently limited to biological organisms, as shown by the example of the thermostat, which was designed to link the operation of heating systems to room temperature. On a purely causal level we can therefore follow the issue down to the level of inorganic matter.

Within the biological world, the ability to differentiate is clearly extremely basic, not only on a cognitive level, but also at the pre-cognitive level of differential reaction to stimuli. Johnson-Laird (1988), in his textbook on cognitive science, suggests as the most basic example the ability of the coli bacillus to propel itself towards food and away from toxic substances. Differential reaction as a property of a form of life has a functional significance from an evolutionary point of view. If the coli bacillus had been wired up the other way round, so that it moved towards poison and away from food, it would not have survived long. Above the single-cell level, practicing the 'four F's (feeding, fleeing, fighting and reproducing) requires an ability to respond with the appropriate F depending on which situation the organism finds itself in. Any viable organism must respond appropriately to the affordances offered by the environment.

From the perspective argued here, treating classes of input events as 'the same' can either be a very primitive or a very subtle achievement. The bacillus that has one reaction for food and another for poison exemplifies a primitive version. The physicist who succeeds in integrating the four basic forces into one grand unified theory would exemplify the subtle version. As a first approximation to a theory of how integration and disintegration must be understood in terms of a ladder of complexity, we can therefore establish a three-stage avenue of progression. First, a primitive stage at which everything is an undifferentiated mass; second, a stage at which distinctions are established – and third, a stage at which distinct elements are integrated into larger wholes.

In the optics of that picture, differentiation is more basic than integration. The two options of the bacillus can be viewed as the logical first step on a path of increasing differential adaptive skill. The bacillus can only differentiate between two relevant states of the world; and better adaptation would entail more differentiation. The multifarious spectrum of .e.g., repellent states out there cannot be regarded as 'integrated' from the bacillus's point of view, properly speaking. They are, rather, the same, or 'undifferentiated'; it literally 'makes no difference' to the bacillus which of the states trigger the reaction of repulsion or attraction. In order to speak meaningfully about 'integration', there must be separate entities that can be brought into a (relevant) relationship with one another. Once you have learnt to recognise both thunder and lightning, you can then integrate your reaction pattern based on an ability to link them up in your picture of the universe, as well as in your pattern of response to events. In this picture it is

clear that just as differentiation requires an effort (evolutionary or individual), so does integration – it does not come for free.

This is true also if we view it as a property of reactive skills, such as motor routines. When you learn to play tennis, you learn (more or less well!) to integrate all movements of arms, legs and hands into one response, in the effort to win the next ball. It presupposes the ability to move arms and legs separately, but requires more than that. Integration only becomes relevant after differentiation has occurred – when you have separate options to play with.

It may not always be obvious in the animal kingdom whether a particular behavioural response should be understood as 'integrated' or 'undifferentiated' from the individual's point of view. Behavioural routines of great apparent complexity may be innate as one invariant whole. The sand wasp, cp. Gärdenfors 0000, has a 'digging' routine which it must perform as a whole; if it is interrupted at a certain point, it cannot resume at that point but must begin all over. A primitive, undifferentiated behavioural whole may look like the complete achievement of sophisticated integration, or vice versa.

We are now ready for 'disintegration', understood as distinct from 'differentiation'. In terms of the three stages described above, it would be logical to reserve it for a 'stage four' event in which a successfully integrated whole of differentiated elements came apart again. But it can also be usefully employed about a process that can affect reaction patterns that are undifferentiated from the individual's point of view. For instance, something might happen to the bacillus's propulsion mechanism so that it no longer worked in a uniform way in all cases. That too would be

naturally understood as a form of disintegration. This type of event is important for evolutionary reasons, cp. Deacon (fc); if a whole inflexible routine comes apart, the fragments that result may play a role in subsequent processes of new and flexible forms of integration. In both cases, however, it is a step 'backwards' – from a form of order, whether it is 'stage two' or 'stage three', towards chaos: a round won by entropy, as it were.

The moral so far is that there is a path of complexity in which differentiation and integration both play essential roles at all stages; and these roles need to be understood in close interplay with each other, among other things because 'integrated' and 'undifferentiated' wholes, and the processes whereby they come apart, may be remarkable alike.

2. Cognition and human ecology

Above there has been no discussion about the specifically cognitive level. Exactly where the cognitive level begins is a moot point. In the early days of AI, the property of responding appropriately to changes in temperature was put forward as showing that thermostats have a form of mental life. This view is no longer widely held, but the difficulty of drawing the distinction remains. Johnson-Laird (1988) explicitly stated that the abilities of the coli bacillus is not cognitive. Rather, the creature is wired up in a purely causal way to respond in opposite ways to two sets of environmental states.

However, there is a tradition in cognitive linguistics to emphasise continuity across the evolutionary spectrum. Thus Lakoff and Johnson (1999:17) see the reactions of the amoeba, essentially identical to those of

Johnson-Lairds's coli bacillus, as an instance of categorisation: the amoeba categorises environmental states by reacting to them. Without wishing to deny the continuity – categorisation is of course a way of reacting differentially to the world – I want to stress the difference between purely causal reactions and responses that are specifically cognitive. Only cognitive responses should properly speaking be thought of as instantiating categorization. In this parlance, I do not categorize the room as 'cold' by getting gooseflesh when I enter. There must be an 'inner' environment in which the organism generates mental constructs which possess a life of their own, in order for cognitive science, including cognitive linguistics, to have an object to talk about. The problem of mental differentiation and integration therefore cannot arise before an organism has the ability to generate a mental construct in the first place. By a mental construct I understand something with an intentional relation to something in the 'outer' environment. This means, among other things, that the organism can react to changes in the outer environment by corresponding modifications in the inner environment or, in contrast, project from a change in the inner environment to a corresponding change outside.

These correlations should still be understood as anchored in the more basic ability of the organism to *react* to the current state of the environment, as mirrored in the correlated inner states. Complex organisms have more complex forms of internal correlates to the presence of food or danger out there – but the continuity in terms of environmental pressure means that complex as well as simple organisms are under the same necessity when it comes to the ability to react differentially to food and danger – whether they do it by means of an inner environment or not.

Behaviourism can be understood as a generalization of the assumption that if what matters is the external response, why bother with the internal correlates? Similarly, the extensional tradition in logic can be understood as reflecting a conviction that if what matters is the ability to represent states of the real world, the important thing is to get the external states right – and why then bother with the properties of the internal representations? The most powerful argument against that logic is that the existence of an inner environment changes the world in which an organism lives in ways which cannot be reduced to true or false representations of what is out there. Depending on what kind of inner environment the organism has, its relations to the outer environment can be radically different from those of other organisms in the same 'external' situation. That is why operations on mental representations are not only interesting, but also causally relevant in themselves, and why cognitive science describes the world in which we live, and not only our purely internal ways of representing it. On the other hand, a struggle between the internalist and the externalist approach must be counterproductive in terms of the picture I outline – because of the essential functional hookup between what happens inside and outside the organism.

Differentiation, integration and disintegration as cognitive issues thus begin with the ability of an organism to create a mental construct, for instance as a result of perception. In terms of the duality of differentiation and integration, perception is already fairly complex. In order to see the chameleon on the leaf, you have to differentiate it from its (let's assume) identically coloured surroundings. And if you cannot see all of it together, because there is a twig in front of it, you have to integrate the two

chameleon fragments into a whole animal. Following Bache (2002: 11), I assume that the ability to form a unified mental picture of an 'input' entity in abstraction from perceptual details is a fairly basic skill, shared with a number of other species. Unless we could do that, more complex skills (cp. Bache, ibid.) would not be possible, either.

An essential stage of sophistication is the process of category formation. At a basic level, this probably involves something like the connectionist process of 'pattern recognition': when enough input neurons fire to trigger the relevant output category, we (re)cognise the category in question. This already involves something like conceptual integration: a set of different tokenings are brought together as instantiations of the same type. But there is a source of error involved if we take for granted that the point of departure for categorization should be a full specification of all the features of tokens (as suggested by the experimental setup for training connectionist networks). The opposite approach might be more functionally appropriate, seeing instead categories as 'stage two' elements, emerging from the background of undifferentiated environmental states: how many relevantly different 'events' are there in the organism's environment? In simple forms, categorization can be regarded as the mental correlate to the reactive pattern discussed above. Even if amoebae (in the terminology used here) do not categorize, what they do is the ground floor of the building on which categorization constitutes the second floor. An organism with mental capacity categorizes something as 'food' as part of an overall reaction pattern whose functional point is still to be able to get at it and eat it. As pointed out by Rosch and Mervis (1975), there are good functional reasons why categories should be simplified in relation to the variability of tokens,

maximizing cue validity, etc. Organisms, even if they are more complex than amoebae, do not generally have time to react to all potential features of the environment. Therefore the kind of 'integration' that occurs is more in the nature of reduction of complexity to manageable proportions. Loss of information – as opposed to fusion or integration – is thus an essential element in category formation.

What makes it difficult to keep these things apart is again the parallel between 'integrated' and 'undifferentiated' that was discussed above. The formation of a primitive category is structurally isomorphic with a sophisticated intellectual abstraction over fully specified tokens. Essential to both, however, is the formation of a construct which has only some of the features that might be assigned to tokens. The existence of prototype effects means that categories function as instruments of orientation that highlight certain tokens above others; and that means that the usefulness of concepts is bound up with the horizon of interests that have shaped them. The progress of science therefore depends on being able to forge new concepts as the horizon of interests are revised.

Over and above what Bache calls 'first-order blend', he suggests two categories of second- order and third-order blends; the former involves standard integration or composition operations in language ('red + shoe'), while the latter comprises the 'three-star' cases like the riddle of the monk and the philosopher debating with Kant. Hougaard has shown that these sophisticated forms of blending can only be understood as standing on the shoulders of a kind of differentiation that is superimposed upon first-order blending. Thus *Jensen injured himself* can only be understood as a result of an operation whereby Jensen is split into two separate conceptualizations:

as perpetrator and as victim. Clearly this operation stands on the shoulders of the primitive ability to conceive of Jensen as a separate but integrated entity. Once that is feasible, he can then be subjected to the kind of conceptual differentiation that is necessary in order to assign an act of self-directed violence to him.

Any operation on internal cognitive representations belongs in a context of input-output relations between the organism and the environment. And on a general level, the evolutionary significance of modifications of our internal states lies in how they change our ability to act on external situations. Karl Popper suggested that the ability to envisage what happens means that we can let our hypotheses die instead of us. If we can figure out that something would be a bad idea by testing it out in the internal environment, we do not have to test it out in person, as it were. In the survival perspective suggested by Popper, the possibility of doing mental experiments entails a degree of freedom from the force of circumstances that is absolutely essential – in that, faced with a given external situation, the human mind can react by setting up several alternative representations and perform operations on them. Thus the ability to form complex mental constructs can be understood as creating a challenge to the human mind: can your cognitive operations match the complexity of the external environment so that you are increasingly able to provide the right response to events and conditions out there? Note the changed directionality in the relationship between internal representations and external input events. First-order blending involved getting 'the right picture' in response to sensory inputs. Popper's case involved producing an internal scenario, subsequently checking it against the external danger that

we want to avoid. Deacon (2000) talked about human understanding as beginning by 'producing a hallucination' – which is then submitted to a reality check.

In terms of this picture, differentiation and integration must continually collaborate in getting relevantly accurate representations of new features of the external world. If you want to look ahead, for instance and imagine what the situation is going to be – e.g., when all electronic resources (such as telephone, television, computers, and internet access) become integrated into one system. You need to be able to see these as separate with their individual properties at the same time as seeing them in a fused version, if you want to try to understand what it entails.

A particularly interesting exemplification of this pattern of differentiation and integration in interplay is the existence of compositional syntax in human languages. Animal 'languages', as far as we know, have nothing that corresponds to it. All elements in animal languages can serve as whole utterances. Discussion of the issue of the evolutionary significance of syntax has been side-tracked by discussion of the role of purely formal syntax in Chomskyan generative grammar, but I think the importance of syntax lies in the fact that in human languages we code fragments of less than full utterance format. Some assembly is required in order for communicators to make full use of the resources of human languages.

In the perspective outlined above, this shows that human languages have undergone a process of differentiation, compared with other animal languages. The difference is not absolute. We also have holophrastic utterances like *ouch* and *hello*. But the interesting thing about human

languages in this context is that we have elements like *while* and *kills* and *greatly* – which are useful only if they are combined with other items. The step towards compositional language looks like a step in which differentiation is inextricably tied to integration: What is the use of having an element like *of* (which cannot serve as an utterance in itself) if you do not have ways of integrating it with other elements? Step two (differentiation) is thus, in this case, inherently linked with step three (integration). It would appear to be obvious that we cannot imagine fully separate processes of differentiating into classes of distinct elements being established with no relation to procedures for syntactic integration of these elements into full utterances. The two processes must have been intimately linked.

The most spectacular element of the syntactic part of the story is the integrative aspect: The formulae for building larger wholes out of smaller elements, i.e. that part of it which is bound up with 'stage three'. The child's path into syntax is typically viewed solely in terms of that picture: first, the child learns words, and then the child learns how to combine them into larger wholes. But the element of differentiation (cf Harder 1996) is just as important, and more basic. Unless the child splits her conceptualization of 'sayable things' into pieces smaller than whole utterances, the question of combining them could not arise. And a crucial part of the story is what is involved in getting to the stage at which signs have a life of their own, rather than being ready-to-use situational messages. Deacon (1997) has shown how the path towards symbolic meaning crucially involves a stage at which sign-to-sign relations establish themselves over and above sign-to-referent relations. This is true not only

of the paradigmatic relations, but of the syntagmatic dimension as well. In order to have purely symbolic meanings as part of the syntactic chain, we need to sever the direct referential linkage between words and things.

From this point of view, the interpretation of 'red shoe' as an integrative operation presupposes a differential operation (cp. Hougaard 2002 and Bache's 'second order blending'). This involves factoring out 'redness' and 'shoehood' as a properties of objects from the referential objects themselves – and coding these properties as symbolic meanings with no referential link to a specific situational tokening event. Deacon (2000) has stressed the importance of differentiation as an evolutionary pathway that also applies to language, showing how the natural directionality of understanding the syntactic composition of a complex utterance is by looking at the divisions 'top-down' – a possible. An utterance like *the inquisitive policeman opened the unlocked door* can, for example, be analysed with 'object/action' as the first step, so that the individual contrributions of words like 'inquisitive' only arise at the last stage of (sophisticated) differentiation of the total message. This procedure has a structural similarity to the drawing of formal sentence trees beginning with 'S' – but the pattern of thinking is of course totally different. It approaches, rather, the analytic procedure as a matter of what can be termed 'content syntax' (cp. Harder 1996): seeing the total coded message as divisible into sub-utterance types of meaning in accordance with the way a language structures its content side.

The problem involved here is close to the top end of the path of complexity that is involved in human speech and thinking. But there are features that recur at this level, such as the confusability of behaviours as

representing either primitive lack of differentiation or sophisticated products of integration. The example of the sand wasp can then be usefully compared with the example of 'lexicalized sentence stems' (cf. Pawley and Syder 1983) in human languages. What looks like an intricately composed/differentiated full sentence, may be a verbal routine with little or no compositional variety ('it takes all sorts to make a world, doesn't it'). But in order to understand such fixed routines, we need to see them in the landscape that comprises both differentiation and integration – one side remains only half the picture. The full syntactic decomposability/compositionality remains interesting as the opposite extreme compared to a fixed inventory af invariant utterances, with no differentiation possible. We do not have to claim that total compositionality is the standard way of creating an utterance in order to appreciate the significance of the distinction between languages in which there is a finite list of whole utterances, and human languages in which you can choose your own fragments of meaning (small or not so small), integrating them into a total utterance meaning that you construct on the fly.

3. Mental spaces and 'three-star' blending

Blending theory grew out of the theory of mental spaces as developed by Fauconnier (1985, 1994). Thus blending has been assumed to be by definition a matter of fusing mental constructs belonging in separate spaces. In terms of the very general picture that is now envisaged as appropriate to blending theory, however, it is not obvious why there should always have to be separate mental spaces involved. Mixing water and flour

to form dough takes place in the same physical space, and the inventive cook who envisages a new recipe in which (e.g.) red wine and flour were to be mixed, would not have to invoke anything else than his conceptualisation of the ingredients in order to imagine what would be the result of blending them. Placing them initially in distinct mental spaces would be a kind of superfluous mental cellophane wrapping that would just have to be discarded in order to get on with the experiment.

More generally, as argued in Harder (fc), the specialized apparatus of mental spaces might usefully be restricted in application to cases in which there are reasons to assume that the mental ingredients cannot be accommodated simply in one coherent space. The key case in most of the standard examples involves situations where a contradiction is suspended in order to create an imagined fusion. Because you cannot physically race a clipper that sailed many years ago, you have to create an imagined space in which a solo performance can take on the properties of a race. Because the monk cannot physically perform the two journeys on the same day and 'meet himself', you have to create an imagined space in which this can take place in order to solve the riddle. This kind of blending, Bache's 'third order', is a highly sophisticated achievement. It is a vintage example of the kind of freedom from environmental constrictions that human conceptualization enjoys, and which enables it to rise above reacting to the situation as it is, creating a greatly enriched environment to act in and upon. It is in fact even higher on the scale of complexity than the kinds of integration that are involved in compositional syntax (cf. Harder fc). The ability to entertain two conflicting pictures of the same situation is not reliably present in children until after age four, by which time they have

acquired their basic compositional syntax. Unless you can entertain two conflicting pictures of the situation, the possibility of fusing them into one does not arise.

I am going to argue that the ability to handle contradictory assumptions is a crucial aspect of three-star blending. Integrating mental spaces only becomes necessary, as well as possible, when there are two spaces in which objects have partially conflicting statuses, and the power of three-star blending is to bring these conflicting properties into play at the same time. As a result of that, the contradictions may ultimately become levelled out, in which case the oomph goes out of the blend – which may be exactly the purpose for which the blend was useful. Once contradictions are allowed to play themselves out, they may suggest new and interesting non-contradictory features of the landscape, and these emergent features may form a useful point of departure for the 'post-blend' stage of operations. (What emerged from the debate with Kant? At what point did the monk meet himself? Who was fastest in the clipper race?)

In this perspective, it becomes crucial to attend to the status of blended spaces in the cognitive processes of the human subject. Turner (1996) mentions an example that was told to him by a listener to a talk on blending. In this example, the protagonist came home drunk without his latchkey; and in this problematic situation he suddenly had a brainwave: he could just ring the doorbell so that he himself could come and let him in! When Turner says that this is exactly the same mechanism that is at work, I think this is both correct and not entirely correct. In order to understand what is involved here, it is important to return to the ecological perspective. Someone who believes that he can summon himself to let him into his flat

is ecologically in a different situation from the person who can fuse the monk's two journeys in order to solve a problem that would otherwise be untractable. The ability to summon up a picture that is different from the actual situation is presupposed in both cases, cp above. Deacon's terminology appears apt here: the intoxicated mind produces a 'hallucination' in response to an environmental challenge, and tries to match it with the situational need that it is supposed to address. From the observer's point of view this has all the marks of three-star blending – but if we want to see blending operations as examples of adaptively important kinds of cognitive achievement, we need a distinction here. To recruit a term from everyday life, getting 'mixed up' occurs when the conceptualizations you invoke don't live up to the purposes to which they should be suited; there is a mismatch which means that you are unable to live up to the cognitive demands that the situation puts upon you. Real, three-star blending is a case of rising above the restrictions imposed by the physical situation. What makes it appear alike is that once you have grasped the nature of the mix-up, the *story* that you can tell has all the properties of three-star blending. *Now* you can use the mix-up as a blend of contradictions that can be contrasted with the real world (for humorous effect, hence with promises of adaptive success).

However, as pointed out by Deacon (2002), this duality can be seen as part of an evolutionary cycle of degradation and reorganization that accounts for the ability of humans to operate in relative freedom from genetically imposed, inflexible reaction patterns, developing instead a capability of flexible response to a diversity of environmental challenges. A gene that has been selected for through generations may become 'masked'

for selection because other features in the organism or its environment duplicates the function that was previously selected for. The white-backed munia has been bred in captivity in Japan for 350 years and in that time it has lost genetic control of its song pattern – because breeding was based on plumage only, masking gradual deterioration in the 'song' genes. As a result, there is now a variety of song patterns, and birds now reproduce patterns they hear around them – because the loss of a strong genetic bias opens the door to weak, environmental biases (imitating recalled sounds, for instance). In the case of human communication, a striking fact is that we have fewer 'calls' than most species (laughter and sobbing are remaining examples). The flexibility of human communication can be seen as involving a reorganization of 'fragments' that became available for selection once the inflexible responses disintegrated.

Initially, the loss of the genetic pattern is a form of degeneration: loss of pattern through noise or error in the genetic copying. But the pattern of random 'disintegration' opens the door to the establishment of new integrative patterns – also genetically. Ecologically, it might be an advantage in terms of brute efficiency if conceptualizations such as the one where the idea of summoning yourself to let you in simply never occurred. Thus if you are in a neck-and-neck Darwinian struggle for providing the environmentally pat response in certain set types of situations, you win if you are inflexibly wired to react in exactly the right way every time. If this need is masked in some way, 'errors' sneak in through accretion of noise. The leeway for producing a scatter of 'mistakes' creates a variation that can then be productively used for adapting to new environmental biases. Thus the slack that allows us to make the 'mistake' of producing an incongruent

coneptualization creates the option of using conceptualizations creatively instead of only as a response to direct environmental need – including the option of using incongruent conceptualizations in three-star blends.

The moral is that the sophisticated creative achievement of three-star blending needs to be assessed in the context of less complex but presupposed forms of differentiation and integration . And three-star blends are cases where the subject is able to bring two contradictory states into play and successfully manage the counterpoint relations between them and his relations with the surrounding world.

4. The role of social and emotional integration in relation to conceptual integration

In the context of language and language learning, the importance of social-pragmatic factors has been argued by Tomasello (1999, 2000). One type of trans-individual relationship that is extremely important in the human world is bound up with a phenomenon which Tomasello has brought to focal attention. It is the kind of cognitive relationship with other human beings that comes about in the period just before one year of age in human children. The central feature of that relation is the element of identifying with other human beings to the extent of understanding them as beings with the same kind of mental life as oneself. Interactively, this is reflected in episodes of joint attention, in which children tune in to the objects that caregivers attend to. In terms of learning, it is reflected in what Tomasello calls 'imitative learning', where the child wants to be able to act on the world in the same way that the adult does. Seeing what the other is seeing, and becoming able to do what the other is doing, becomes singled out as a

special feature of seeing what is in the world. Tomasello (2000) shows based on empirical data that this ability to tune in on caregivers' intentions is crucial for types of learning that have been attributed to direct observation in conjunction with 'constraints' serving to solve Quine's 'gavagai' problem – i.e. deciding what segment of reality a given word was to be associated with. But we do not need a 'whole object constraint' etc, if the process is driven by the ability to tune into what the other person is getting at.

This form of intersubjective attunement plays a crucial role for learning, greatly enhancing possibilities of indviduals learning from others (cf. below). Under the Popperian assumption that typical reaction patterns can be assumed to have a subjective counterpart, we may assume that the behavioural bias towards seeing what others are seeing is supported by an emotional bias. In the positivist tradition, cognitive and emotive factors were believed to belong to different worlds. However, in the context of cognitive science, the intimate relationship between emotion and cognitive capability has been pointed out by. Damasio 1994). One of the most celebrated cases of brain damage in a surviving patient shows that intellectual performance *per se* could be intact and yet not suffice to preserve the subject's ability to function – because getting the right picture is not enough if you cannot integrate the right picture into a coherent sense of who you are and where you are going. In order to manage that kind of integration, the subject must be able to associate values with the imagined situations and have those values guide one's actions.

The kind of emotional mechanism that will be relevant in the following can be described by reference to a theory proposed by Melanie

Klein, which has been very influential in the history of psychotherapy.The main element in it is that the infant child's basic sense of 'being' is based on a polarity between 'good' and 'bad' that shapes simultaneously the sense of self and the sense of objects in the world. Being nursed and cared for by the mother is associated with an emotional 'goodness' that is simultaneously a property of the child's inner feeling and of the object that brings about this feeling, namely the mother. Being left alone and hungry or in pain is associated with a 'badness' that is also simultaneously inside the child and out there as a property of those who fail to relieve the sufferings of the baby. Getting a realistic sense of being in the world is based on a maturing ability to differentiate what is inside and what is outside the self, as well as a sense of how good and bad is mixed up both inside and outside the mind. A good life is closely dependent on the ability to stabilize an inner sense of feeling good and attach it to those objects out there with which this feeling is associated. In a world where good and bad is mixed in messy ways, getting a good life depends on being able to recognize goodness in a mixed environment, and a criterion of emotional maturity is therefore the ability to maintain sustaining relationships in spite of 'noise' in the sense of adversity: bad news must not threaten an overall sense of underlying good relations. There is a symbolic relationship between inner 'objects' and external object associated with them: good things out there 'represent' the meaning they have for the human subject, and vice versa (cp the phrase 'George is bad news'). Symbolic relations can also be transferred based on analogy, e.g., a broken shoe can serve as a symbol of an inner defect in personal relations, cf. Temperley (2001). Cognitive capacity in the service of existential needs must form realistic

pictures of objects while recognizing their status in terms of the emotional significance attached to them by virtue of the inner states with which they are associated. Just as you 'introject' a picture of objects out there that you like, you 'project' an inner feeling of 'goodness' on to objects out there that come across as fitting into the sunny side of life. This kind of emotional metabolism is at work all the time and constitutes the rock bottom of your sense of values, of where you stand in relation to the world around you.

This is of course a very simplified picture. But just as for the amoeba and the coli bacillus in the behavioural domain, the binary choice between things we are drawn to and things we are repelled by is a very basic dichotomy in the emotional domain. As pointed out by Popper, this can be seen as the survival value of emotional correlates to external situations. If you 'feel drawn', you have an extra factor pushing you towards a good thing, thus increasing the chance that you get there first, as it were.

The relation with blending and conceptual integration arises when there are emotional factors at work in the landscape in which we try to differentiate and integrate pictures of the situation. Again, we shall find that three-star blending is marked by the ability to manage conflicting pictures – but now the conflict is not logical, but rather emotional.

In Klein's theory (cp. Bronstein 2001), there is an early stage of development in which the infant mind tunes in to the world based only on its own feelings, sharply divided into 'good' (the mother who is there and nurses the baby) and 'bad' (the mother who is not there when the baby needs her). The infant is incapable of apprehending a real object out there who is both at the same time. Emotional maturity and the ability to get a 'whole', realistic picture of the world hang together. Only if you have a

solidly established emotional anchoring can you 'afford' to acknowledge that objects out there may sometimes do what you want them to do and sometimes not, and yet be identical to themselves. Getting an 'integrated' picture of objects, where fragmentary experiences with different emotional colourings are brought together, is an emotional achievement as well as a cognitive achievement. There is a formal parallel here with the 'binding' story of perception, where the question was how isolated percepts could be united into a whole perceived object. Both processes of integration are necessary in order to be able to act competently in the world.

In this context, the most interesting feature of this account, however, is in its implications for the cognitive-emotional capacities of 'normal' adult subjects. Even if the subject has successfully mastered the transition to getting whole and realistic pictures of objects in the environment, this achievement is not guaranteed to function optimally in all cases. Just as a measure of security is necessary to acknowledge the co-presence of good and bad in objects in infancy, so the ability to tolerate complexity in adulthood is variable depending on the adult's perceived security. The more you feel threatened by something, the more difficult it is to allow that something to contain a measure of good. Your rival for promotion tends to be perfidious as well as hypocritical, and his qualifications for the job often play a somewhat marginal role in your conceptualization of him. The ability to retain a realistic picture is better, the more you are able to retain enough sense of security that you can allow your rival to have the job without losing your own ability to 'feel good' about yourself.

This also shows that the picture of the other is bound up with the picture you have of yourself. The reason you may have to build up a bad

picture of your rival is that you need to have a good picture of yourself. If you assign too much that is good to the other, you may wind up feeling short of it for the purposes of maintaining a desirable image of who you are yourself. The threat thus may create a distorted image of your own personality as well. While you could live with a sense of certain shortcomings in your own performance until the rival materialized, this part of the picture becomes unbearable in the insecurity that has now arisen. The ability to see objects whole is thus a variable capability in normal human subjects – depending on your emotional state, which again depends on the threat level of the current environment.

5. Polarization – and the two forms of blending that are involved

This is especially interesting in cases where there is a dynamic operating to increase emotional tension and insecurity. Cases of polarization occur when two parties interact in such a way that each act in a sequence brings about a greater sense of threat in the other party. According to the mechanism described above, such a series of acts will be attended by a progressive deterioration of the ability to get a realistic and coherent picture of the other party. By the same logic, the picture you have of your own side will become progressively less realistic in the same degree.

This process has a certain structural similarity with the relation between categories and instantiations. There is a simplified superimposed picture, which involves a loss of information in comparison to the features of concrete tokens in the environment. However, it should be stressed that categorization must in itself be understood as a step forward in terms of

flexible response to the environment, even if categories leave variation out of the picture – because categorization should be understood against the background of less differentiated forms of reaction, cf. above. As against that, there is no conceptual side gains involved in the simplification process associated with polarization.

This means that it should be understood as a process of conceptual disintegration: whole complex conceived objects are replaced with progressively more stereotyped and caricatured versions. Conceptual elements that start out as part of a differentiated-but-integrated whole, disappear out of the picture, leaving an impoverished remainder. In the beginning, people on the other side have various mixtures of good and bad in them. As polarization increases, they are gradually emptied of all the good in them. They thus become more conceptually alike, simply because they share the fundamental property of being on the wrong and threatening side.

The dynamics is essentially the same whether it is a case of two individuals with an escalating conflict, or two groups. But if there are two groups involved, the individual bias towards disintegration is reinforced by the reactions of other people in the group. The attunement described by Tomasello means that even if an individual member of the group might feel secure enough to retain his ability to see things in an unbiased way, his orientation towards seeing what his mates are seeing would expose him to pressure to adjust his conceptualizations, especially in a context where security is perceived as depending on group solidarity.

The bias created by identifying with what the other is doing and seeing can be seen from an experiment reported by Tomasello. The setup

was that an adult human instructor demonstrated how an inaccessible banana could be retrieved by the use of a tool. There were two groups of subjects, one of human children, the other of young chimpanzees. Both groups succeeded in getting the banana – but the human used the same stick to retrieve their banana, while the young chimpanzees did it using a superior implement that was also to hand. Crucial to the human children was that they learned to do what the other person was doing, rather merely than achieving their own personal end. This also illustrates that the element of identification may cause subjects to forfeit personal gain in order to act in accordance with the pattern of the group. While this may look like stupidity, it is bound up with what we customarily look upon as a social skill: the sense of belonging with other people, being part of the community. If you always went for the banana any way you knew how, you would not have time to imitate the skills of the group. 'Cultural learning', in Tomasello's phrase, would be impossible, if we humans were not willing to imitate what others did without worrying about doing what seemed ,most advatageous to ourselves. However, the experiment makes clear that there is a price to be paid: you may not get the banana as quickly as if you had refused to let yourself be distracted by the way the other person did it. The dilemma is a version of the question put by Groucho Marx: Who do you believe? Me or your own eyes?

The kind of conceptualization that operates under pressure from polarization involves both simplification and integration. In the process of reconceptualizing a number of diverse phenomena to fit the role of a growing threat, there is a process of blending with ensuing emergent effects as well as a process of conceptual loss involved. The latter element entails

that they violate the standard constraints – because of the inherent bias. Thus the 'web' principle (cp. Grady, Oakley & Coulson:1999: 108) is not necessarily observed: events in the input spaces may be lost if they run against the bias, cf. below. The reason we do not go directly for the most simplified caricature is that the optimization principles are not simply rendered null and void. There is blending going on, even under pressure: a number of individual conceptualizations are brought together in the same space because they are placed as occupying the position of 'enemy' – thus requiring a process of conceptual integration.

For example, it was not a given thing how to conceive of e.g. all things German as belonging in the same 'bad' mental space, even at a time when Nazi Germany was becoming more and more threatening. In a Danish perspective, Germany was still the overwhelmingly dominant cultural force in music, philosophy and literature at that time. But under pressure of the situation the differences can be brought to fit under the same cap. At the end of the war a prominent Danish intellectual talked about ridding the future of the' moonscape of German thought: endless swamps of meaningless verbiage surrounded by highlands of vicious nonsense, crowned above by eternally snow-capped peaks of pure madness'. War propaganda, ruthless authoritarianism, concentration camps, the Nazi reinterpretation of Nietsche and German speculative metaphysics all hover around this complex blend of geography and philosophy. There is a real mental achievement involved in configuring all German thought in such a way that it will fit snugly into an integrated picture of Germany as the embodiment of evil.

However, this is a blending process of a peculiar kind. While a central property of emergent effects is to create something that wasn't there in the input spaces, the kind of blending that goes on in polarization is oriented towards creating uniformity with a preconceived pattern It could perhaps more appropriately be called 'meltdown' than blending. The chief actor in the process in neither the blended nor the input spaces; rather, the generic space for people on the wrong side could be seen as the driving force. The direction of the conceptualization is towards draining the input conceptualizations of significant variation, superimposing upon all things the same colour of badness. Disintegration is part of the blending that takes place, because the elements of the complex picture lose their differentiated status and melt into a congealed block of badness. The blended space becomes progressively more like the generic space while it becomes more and more uniformly bad; and the end product may be a caricature that stands for everything in the input – Hitler embodying everything German. And externally, of course, the disintegration is obvious: a complex world is cut in two halves: bad or good.

This may sound like unnatural stupidity. But like other cognitive mechanisms, it must be understood in a functional context. The evolutionary advantage of having emotional qualia align with functional needs, cf. above, is also relevant here. If survival depends on marshalling all your resources against a threat, it would be counterproductive to allow yourself to have divided feelings about the enemy; and if your cognitive picture is divided between good and bad, this is difficult to avoid. Governments, of course, have always been keenly aware of this; hence the maxim about truth being the first victim in any war.. This is familiar in the

history of international relations (cf. Kristiansen & Rasmussen 1988): in times of war, the enemy is perceived as the devil himself. But it would be simplistic to see this as simply a matter of propaganda. It also spontaneously affacts the man in the street and most intellectuals alike. And if you are not part of that atmosphere, you will find it inconvenient to show this in a group of people who are on the same side as you. The sense of there being very elementary forces at play is palpable in cases of that kind.

Getting a balanced picture of mechanisms of this kind is therefore extremely difficult. It requires rising above pressing functional needs as well as available pictures of the world. It requires, in fact, a form of blending that may be the most difficult of them all. At issue is the question of how you can 'pick up the pieces' and find a way to reintegrate them in both a coherent picture of the situation and a coherent picture of the strategy of action that you choose. In a polarized context, this means you need to confront both physical and emotional contradictions and construct a blended space in which the right new possibilities can emerge.

6. Sharon – a man of peace

Based on the pattern described above, a reconstruction is possible of the process whereby Sharon can emerge as a man of peace in someone's cognitive space. The scene involves two sets of events, one of which is the ongoing polarization between Israel and the Palestinians. The other set involves 911 and its emotional and political impact on the US. I assume that there is an input space containing Ariel Sharon as the person who

headed the invasion of Lebanon in the 1980s and incurred censure from his own government for his role in the events that involved massacres in two Palestinian refugee camps; who triggered the ongoing intifada by his visit to Al Aqsa in December 2000; and who uses military destruction of Palestinian infrastructure as part of a strategy to fight Palestinian terrorism. In another input space we find President Bush as orchestrator of the global fight against terrorism, in which the need to find and apprehend the instigators of terror overrides a number of other concerns. The terrorists he is fighting are Muslims and on the side of the Palestinians, and enemies of Israel; and Israel is an ally of the US.

All these are part of the same world, and there is no inherent reason why they might not fit into one and the same mental space, fori instance a dispassionate expert's space of 'the current situation in the Middle East'. However, in terms of the American scene, these two sets of events may plausibly be regarded as belonging in separate spaces – because they do not readily integrate into a coherent background for US policymaking. In that context, this creates a question: how do we integrate the two spaces? The functional context of the question is one in which an integrated picture is increasingly necessary for President Bush; there is no way of ignoring the Middle East (including Ariel Sharon) and still set up a global strategy against terror. Therefore in spite of George Bush's evident desire not to get involved in the Israeli-Palestine conflict, just letting the different pieces lie and not getting them together is increasingly not an option. For Bush it is therefore necessary that Sharon finds a place in the overall picture that is consistent with the policies to which the President is committed.

I would like to emphasize that the task at hand has no obvious solution, whatever your stance on the issue. All easy answers to the question depend on ignoring or suppressing considerable parts of the picture. My point is thus not to suggest anything in the nature of 'as any idiot can see, the right picture is such-and-such'. The interesting thing is to see the actual outcome in the functional and cognitive context in which it belongs. In terms of the theory I have outlined, what happens is that the President is acting in a situation of emotional insecurity in the United States, and increasing polarization of the Israeli-Palestinian conflict; in terms of the mechanisms described above, there is considerable pressure towards getting a simplified picture of 'them' and 'us', and a low tolerance of complexity. While Palestinian suicide terrorists fit unambiguously into the picture of the enemy, Sharon is not unambiguously on the side of the angels in the input space. Something has to be done about this, in order to avoid having a mixture of good and bad that is currently emotionally unbearable.

The president casting Sharon as a man of peace is a step towards the resolution of this conflict, achieving the possibility of a kind of harmonious blending on the side of 'us' that would otherwise not be possible. President Bush basically wants peace, but has been forced into an all-out military effort against muslim terrorists threatening civilians in his country; Sharon basically wants peace, but has been forced into an all-out military effort against muslim terrorists threatening civilians in his country. It may not be a very accurate picture, but it is emotionally satisfying, and politically convenient: whose side are you on, anyway?

The alternative form of blending is the one that was described as the most difficult of all: to construct a whole picture out of fragments that are physically as well as emotionally contradictory. To filter out what US interests are shared with Sharon and with the Arab world and use it to construct a blended space that can contain both Israeli and Palestinians is currently an almost impossible task. And to this task is added the onus of setting up a path whereby that blended space is made the blueprint for an actual physical space, which is hardly any easier. For an American president, there is a great deal that counts in favour of trying to do a little reconceptualization work on Ariel Sharon, so that harmony can be achieved on the side of the goodies.

The polarization effect is also evident in relation to the conceptualization of terror as it affects the US in the sequel of 911. The war in Afghanistan clearly comes across as a different event as seen from the point of view of the Muslim world and from the American point of view. At one point, I watched a television interview with an American official. The issue was American relations with the Arab world, and it included (something like) the following exchange:

Interviewer: Is there not a risk of alienating the Muslim world and thus sowing the seeds of future terrorist activities?

U.S. official: You are playing on Bin Laden's turf. I think you should stop playing on his turf.

The point is not that the interviewer was factually wrong – quite the opposite. The more factually right he is, the worse it would be for the purposes of the mental space on which policy-making is based. In order words: 'Do not pollute our emotional space with alien considerations. We want no unauthorized blending activities for the duration of the war'. From the intellectual point of view, this response is clearly inadequate; but from the policymaking point of view the official has a point. If you feel you are currently a likely victim, you cannot afford to have divided feelings about the aggressor, as discussed above.

The question then is what the most serious threat is. In *The Best and the Brightest*, the path that led to the American involvement in the Vietnam War is described, based on the metaphor of 'keeping one's eyes on the ball'. Staying tuned to the perceived need of creating support for a full-scale military effort leading (inevitably, or so it was believed) to victory was criterial for being on the right side. Awareness of the inevitable element of conceptual disintegration would not have stopped it (whose side....?); but it is a necessary element of understanding how these things can happen. Once the pressure is gone, the protagonists may look like madmen or morons. But that is one of the benefits of hindsight.

This example also shows that the effects of polarization may arise without a compelling context to bring them about; the US was not threatened, properly speaking, by the civil war (as it then was) in Vietnam. The phenomenon of 'groupthink', however, is a classic in the literature on organization theory, used to describe cases where a group of responsible agents get stuck in a rut of mutual confirmation of a stereotyped pattern of thinking – which itself serves to define proponents of new ideas as

enemies, even when the situation would not appear to make such a reaction necessary (cp. Janis 1972).

In another context, similar distortions may arise. Tannen (1998) attacked polarization as a media strategy: in order to generate sufficient excitement about an issue, it may be advantageous to present two debaters as it they were locked in mortal combat, focusing solely on the disagreements instead of the possibilities for communication. In both cases, conceptual disintegration is an inevitable concomitant.

7. Summary and final remarks

I have tried to pinpoint the place of 'three-star' blending in a hierarchy of complexity and show its significance in situations of social and concomitant emotional pressure on processes of conceptualization. In order to do that, I tried to show how the stages of differentiation, integration and distintegration must be understood in relation to each other at different levels of complexity. A decisive step from an evolutionary point of view is that human mental constructs became freed from direct environmental pre-wiring, thus giving human subjects the freedom to perform operations of differentiation and integration with an open potential for enrichment of both the conceptual landscape in itself and for projections into the interactive and cultural environment. Disintegration is the parallel effect of entropy in the realm of conceptualization and can as such be assumed to be always at work. It is the logical converse of integration, but as such it plays a dual role: by breaking down previously fixed wholes that might well be inadequate, and supplying fragments as material for new integrated wholes,

it contributes to the flexibility of cognition. On the other hand, disintegration is one up for entropy, and a step downwards in terms of complexity – which means also that the ability to conceptualize complex wholes adequately is always potentially at risk. The fact that conceptualizations may become totally fused routines means that it is never easy to tell whether a given conceptual response is a highly sophisticated integration of differential elements, or it is a stereotyped pre-fab – as exemplified by motor routines as well as by set phrases.

Among the elements sketched out above, I focus on the role of contradictions in different types of conceptual integration. Three-star blending is distinguished by the way it enables the conceptualizer to superimpose two pictures that could not occur together in the reality space without 'cheating', i.e. in a way that preserves the contradictions while suspending them for the purposes of bringing them together in the blended space. The power of three-star blending is in the way it allows you to transcend to limitations of current conceptualizations of reality, without ignoring the contradictions that you are for the moment overruling. 'Meltdown' under polarization, in contrast, involves ignoring selected aspects of the input spaces, as well as changing 'minus' to 'plus' in places, in order to achieve an emotionally convenient fusion between disparate and contradictory aspects of current pictures of reality. The result is a response that integrates all the different manifestations of 'enemy activity' under a stereotyped and inflexible reaction pattern, which is supported by strong social control from the outside and emotional pressure from the inside. If it is subtly put together, it may look, from the outside, as true conceptual integration – but viewed in its social context, it is really a 'block' response

designed to stamp out any undesirable emergent effects of complex conceptualization. And if the social and emotional pressure is strong, few escape.

The most difficult blending operations, in consequence, are those that require the ability to create a blended space out of elements (including human!) that are both emotionally, politically and physically in direct conflict. An important part of the message is that conceptualizations must be judged against the pressures of the situation in which they belong. Intellectuals should avoid the risks of smugness inherent in unfolding their capacity for conceptual sophistication, especially if they are not subject to the pressures in question. Although thinking and conceptualizing can (and should!) to some extent be done for the heck of it, the ecological context is never absent, and with it the Darwinian selection processes that decide which of the possible resultant pictures that 'survive'. If we want to see conceptual integration in terms of the achievement it represents, the ability to avoid meltdowns, maintain real blending and make it stick under pressure are important aspects of the picture.

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All papers deal with the topic of the conference: Gilles Fauconnier and Mark Turner's theory of 'conceptual integration' (also known as 'blending'). During the last nine years, blending research has developed from an extension of Fauconnier's mental space theory which was supposed to handle the intricacies and emergent properties of specific things such as counterfactual constructions and metaphors to a vast research programme about what constitutes cognitively modern human beings: about the way we think. Today blending is investigated in a broad range of areas: literature, linguistics, psychology, semiotics, neurology, musicology, social science, art, philosophy, mathematics, anthropology, and film science.

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Institute of Language and Communication
Campusvej 55
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